

PHYSICS PROGRAM

GRADUATE STUDENT HANDBOOK

June 2021

1. Introduction

Program Overview

In the physics graduate program we aim to deepen a student's basic knowledge and understanding of theoretical and experimental physics, as well as to guide him or her to achieving expert status in a particular area of contemporary interest to the physics community. By carrying out a research project in collaboration with a major-professor acting as mentor, the student will develop the skills required to initiate, and carry to completion, an independent research program upon obtaining an advanced degree. Research in the Department of Physics emphasizes the areas of condensed matter physics, nuclear physics, astrophysics, and biophysics. In addition, there is an interest in research on physics teaching.

Welcome from Department Chair J. Hiller

Welcome to the UI Physics graduate program! We are determined to help you succeed in your course work, your research, and your career. You may even discover new interests: the research areas of the department cover a wide array of frontier topics, supported by grants from NASA, NSF, DOE, and other agencies that include funding for RA positions. As you explore the department and your options, do not hesitate to talk with faculty, to help you get your bearings and to find opportunities. If you have any concerns, bring them to the Director of Graduate Studies or to the Department Chair.

Be sure to consult the Director when planning your course registration. Most graduate courses are offered in alternate years, and you don't want to miss them. The core courses are particularly important, as preparation for your research and for the preliminary (a.k.a. qualifying) exams.

But now is not the time to worry about exams. Find your desk in your new office, meet some fellow students, and enjoy your new home.

Getting Situated: Frequently Asked Questions:

- Where can I get the appropriate keys I need for access to my lab/office/classroom?
 - The department administrative assistant in room 311 handles the keys.
- Is the printing room only available for use by the faculty?
 - No, the printing room which includes a computer and two printers is available for all physics students, faculty and staff. Just ask for the access codes. The University of Idaho also awards printing credits to graduate students each semester that can be used at other printing locations on campus.
- Is there available office space for me?
 - There are various locations where graduate students have office space such as EP301, EP302, and Gauss-Johnson 220. Contact the departmental administrative assistant before arriving and we will find a location for you.
- Is there a computer terminal available for me?
 - The department does not normally provide computers to individual students, but individual faculty members may provide computers to their graduate students to facilitate their research work. There is a terminal in the copy room available to all; just login with your UI username and password.
- What classes should I plan to take?
 - See Section 2 of this handbook for details about the recommended coursework for your program. You should be able to register for courses via Vandalweb. Feel free to contact the department chair and/or directory of graduate studies if you have any questions about particular courses.
- What do I do if I have any questions?
 - Contact any of the people below.

Contact Information:

Department Chair: John Hiller (E/P 311A, jhiller@uidaho.edu)

Department Administrative Assistant: Jessica DeWitt (E/P 311, jdewitt@uidaho.edu)

Director of Graduate Studies: Matthew Hedman (E/P 323, mhedman@uidaho.edu)

2. Program Components and Degree Requirements

The physics department offers graduate curricula leading to the M.S. and Ph.D. degrees. A bachelor's degree in physics is normally required as preparation for graduate study. Students with a bachelor's degree in another physical science, engineering, or mathematics will generally qualify after removal of a few upper-division-level deficiencies (see Section 3.1).

Note that students earning less than a 3.0 GPA will be placed on probation. If they do not gain a 3.0 GPA in the next term they will be disqualified. If the student on probation gains a 3.0 in the subsequent term but the overall GPA is below 3.0 they will remain on probation. See sections L-9 through L-11 of the University of Idaho Catalog. (<https://catalog.uidaho.edu/general-requirements-academic-procedures/l-academic-standing-probation-disqualification-reinstatement/>)

Detailed requirements for thesis and non-thesis options for an M.S. degree, as well as a Ph.D. degree, are provided below, and can also be found in the current version of the University of Idaho Catalog (<https://catalog.uidaho.edu/colleges-related-units/science/physics/#graduatetext>). Note the M.S. is not a prerequisite for the Ph.D. but beginning doctoral students may earn the M.S. if they wish. General departmental course requirements exist for the M.S. and Ph.D. degrees, in addition to the general requirements of the Graduate College. Other course requirements are specified in the student's study plan, developed by the student and his or her advisor and approved by the student's supervisory committee and the department chair. All graduate students are encouraged to gain some teaching experience during the course of their graduate studies.

2.1 Master of Science. Major in Physics. (Non-thesis Option)

General M.S. non-thesis requirements apply.

The requirement is a minimum of 30 credits in coursework and the credits must be distributed as follows:

Code	Title	Credits
Physics Courses Numbered 500 and higher ¹		20
Courses Numbered 400 and higher ²		10
Required Courses ³		
PHYS 521	Advanced Mechanics	
PHYS 533	Statistical Mechanics	
PHYS 541	Electromagnetic Theory I	
PHYS 542	Electromagnetic Theory II	
PHYS 550	Quantum Mechanics I	
Total Hours		30

Courses to total 30 credits for this degree

¹ (including 2 cr for [PHYS 501](#) Seminar and no more than three credits from [PHYS 599](#) Research)

² These may be non-physics courses upon the approval of the physics department Academic Standards Committee.

³ Included in the 30 minimum credits

Students must pass a comprehensive examination, which must be taken at the first offering after the student has completed the core courses required for the M.S. degree. Full-time students may not delay the completion of their core course requirements by avoiding the taking of a core course when offered except with the prior written consent of the Academic Standards Committee and the student's major professor. The examination is written and covers all of general graduate-level physics as defined by the required courses for the M.S. degree. Typically, it will be administered on two different days, with a time limit of approximately three hours for each day. The results of the examination will be evaluated by the physics faculty. If the comprehensive examination is failed, it may be repeated only once; the repeat examination must be taken within a period of not less than three nor more than 14 months following the first attempt.

2.2 Master of Science. Major in Physics. (Thesis Option)

General M.S. requirements for a degree with thesis apply. The student must complete a total of at least 30 credits at 400 level or higher, 20 of which must be at the graduate level, including a maximum of 10 credits in research and thesis, with no more than three of these credits from [PHYS 599](#). Specific departmental graduate course requirements are 2 credits in [PHYS 501](#) and [PHYS 521](#), [PHYS 541](#), [PHYS 542](#) and [PHYS 550](#). If a student's undergraduate preparation is considered deficient, then certain undergraduate courses will be required in the study plan. Such remedial credits are not to be counted towards the total required for the degree. No departmental comprehensive exam is required.

A final defense of the M.S. thesis is scheduled upon completion of the thesis. The candidate is required to defend his or her work and show a satisfactory knowledge of the field in which the thesis research has been performed. The defense is oral and would typically last for one hour. The exam has to be announced to the physics faculty at least one week in advance. All members of the physics faculty are permitted to attend and ask questions. A recommendation of a majority of the student's graduate committee is necessary to pass the defense. If the defense is failed, it may be repeated only once; the repeat defense must be taken within a period of not less than three months nor more than one year following the first attempt.

2.3 Doctor of Philosophy. Major in Physics.

General Ph.D. requirements apply. Correspondence concerning the student's specific goals is encouraged in the preliminary planning of the Ph.D. program.

Specific departmental course requirements are:

Code	Title	Credits
PHYS 501	Seminar (Must enroll each semester while in residence)	2
PHYS 521	Advanced Mechanics	3
PHYS 533	Statistical Mechanics	3
PHYS 541	Electromagnetic Theory I	3
PHYS 542	Electromagnetic Theory II	3
PHYS 550	Quantum Mechanics I	3
PHYS 551	Quantum Mechanics II	3
PHYS 571	Mathematical Methods of Physics	3
At least nine additional semester-hours of Physics courses at the 500 level ¹		9
Total Hours		32

¹ At Least Nine Additional Semester-Hours of Physics Courses at the 500 level, including at most three credits of [PHYS 599](#) (Non-Thesis Research).

A typical study plan would include 40 to 50 credits of course work at the 500 level in physics and about 30 credits in research and thesis. The study plan also would include at least six units of upper-division or graduate course work outside of physics. The nature and number of these additional units will depend upon the professional goals of the individual student. In planning a program, the student should consult with the departmental Academic Standards Committee for approval of any particular choice of non-physics course work. The Ph.D. degree in physics is primarily a recognition of ability and accomplishment in research. The purpose of the course work is to provide the factual and theoretical background for research. Successful completion of course work is not in itself considered as completion of the major requirement for the degree.

All Ph.D. graduate students are required to enroll in [PHYS 501](#) each semester while in residence. No formal foreign language requirement exists for Ph.D. candidates; however in individual cases, depending on the research topic, a reading knowledge in one foreign language may be required by the thesis advisor.

A two-Part preliminary examination is required.

Part I is taken after the student has completed the courses required for the Ph.D. degree. Full-time students must take this exam no later than 2 years after entering the Ph.D. program. Students who have earned a Master's degree in physics or wish to transfer credits to satisfy any of the departmental requirements ([PHYS 521](#), [PHYS 533](#), [PHYS 541](#), [PHYS 542](#), [PHYS 550](#), [PHYS 551](#), or [PHYS 571](#)) may be required by the Academic Standards Committee to take the exam earlier. The examination is written and covers all of general graduate-level physics as defined by the required courses for a Ph.D. degree. Typically, it will be administered on two different days, with a time limit

of approximately five hours for each day. The results of the examination will be evaluated by the physics faculty. If the preliminary examination, Part I, is failed, it may be repeated only once; the repeat examination must be taken within a period of not less than three months nor more than 14 months following the first attempt.

Part II of the preliminary examination is set by the major professor of the Ph.D. student for a date within the second semester after Part I has been passed. The student is required to explain the goals of his or her planned Ph.D. research to the thesis committee and show a general familiarity with the fields relevant for the research. Part II is oral and would typically last for one hour. The exam is to be announced to the physics faculty at least one week in advance. All members of the physics faculty are permitted to attend and ask questions. The student's committee certifies to the Graduate College the results of the preliminary examinations. Upon passing, the student is advanced to candidacy for the Ph.D. degree. If Part II is failed, it may be repeated only once; the repeat examination must be taken within a period of not less than three months nor more than one year following the first attempt.

A final defense of the Ph.D. thesis is scheduled upon completion of the dissertation. The candidate is required to defend his or her work and show a superior knowledge of the field in which the thesis research has been performed. The defense is oral and would typically last for one hour. The exam is to be announced to the physics faculty at least one week in advance. All members of the physics faculty are permitted to attend and ask questions. A recommendation of a majority of the student's graduate committee is necessary to pass the defense. If the defense is failed, it may be repeated only once; the repeat defense must be taken within a period of not less than three months nor more than one year following the first attempt.

3. Some practical advice on pursuing your degree

The prior section provides the official requirements for achieving a M.S. or Ph.D. degree. Here we provide some more practical advice about the various aspects of this process. Additional practical information can be found on the College of Graduate Studies page

<https://www.uidaho.edu/cogs/degree-steps>

3.1 Coursework

Note that the core required courses are typically taught once every two years.

Our program involves graduate-level classes in Classical Mechanics, Quantum Physics, Electromagnetism, Statistical Mechanics and Mathematical Physics. Admitted students with weak backgrounds in one of these areas may wish to take advanced undergraduate courses in these topics first. Please contact the Academic Standards Committee chair (fsammar@uidaho.edu) to discuss these options.

3.2 Some guidelines regarding Ph.D. Preliminary or Master's Comprehensive Exam

In order to facilitate preparation for these exams, copies of exams from prior years are available in the department office.

Assessments of the solutions to individual problems are based on rubrics that contain the following broad categories:

1. The problem is done correctly.
2. The problem is approached correctly, but the final answer is incorrect due to minor calculation errors.
3. The general approach to problem is correct, and the specific calculations are appropriate, but are either incomplete or have significant errors.
4. The approach shows a general understanding of the problem, but one or more of the specific calculations/strategies are inappropriate to the problem.
5. The approach shows a general understanding of the problem, but specific calculations are absent.
6. The general approach to problem is unclear or incorrect, but the student makes some progress in characterizing the system.
7. The general approach to problem is unclear and incorrect.
8. The problem is not done, or, some equations may appear that are unrelated to the question.

For an assessment of passing on this exam, a student must demonstrate good understanding of the physics principles governing each problem, and demonstrate the ability to identify and apply appropriate tools and strategies for solving a sufficient variety of problems.

3.3 Selecting a Major Professor

We strongly advise that every incoming graduate student identify a potential major professor within their first year in the program. The major professor serves as the principle advisor and mentor of the graduate student and typically plays a key role in their research training. Students should seek out faculty members with whom they would like to work in order to start conversations about potential research projects, opportunities and expectations. Having these conversations early will facilitate the transition between doing coursework and doing research, and allow the student to be aware of the options available to them.

The forms for appointing or removing a major professor can be found here:

<https://www.uidaho.edu/cogs/forms>

3.4 Forming the Degree Committee

The degree committee normally consists of four faculty, one of whom is the major professor and one of whom is outside the department. One person can also be from outside the University, provided the appropriate forms are completed. Ideally, the committee consists of people the student can talk to in order to get a variety of perspectives on their research work and future career.

The forms for appointing or removing committee members can be found here:

<https://www.uidaho.edu/cogs/forms>

3.5 Thesis/Dissertation Defense

The overall content of the student's dissertation/thesis is typically left to the discretion of the student and their specific committee.

Relevant forms that must be completed during this process can be found here:

<https://www.uidaho.edu/cogs/forms>

Resources regarding the format and submission of the thesis/dissertation can be found here:

<https://www.uidaho.edu/cogs/resources/student-resources/thesis-dissertation>

4. Safety Training

Safety is an essential part of any working environment, including graduate school. If you are working in an experimental laboratory, it should be obvious that you must be able to use the laboratory equipment properly. However, safety training is also essential if you are going to be teaching students, and even if you are doing theoretical work (for example, you need to know how to keep your computer and notes from being a fire hazard).

The faculty member in charge of your research project is responsible for identifying what safety training you are required to take. If you are not yet involved in a research project, then the Director of Physics Laboratory Education will be responsible for identifying training you need to complete. The Department Administrative Assistant is the designated “Safety Officer” for the department, which just means they are responsible for keeping records as to who has completed what training, not for determining the requirements or content of said training. Questions or concerns about safety procedures should be directed to either the relevant Faculty Member or the chair of the Safety committee for the department.

Contact information:

Director of Physics Laboratory Education: Eric Foard (efoard@uidaho.edu)

Responsible for Safety of Teaching Labs

Safety Officer: Jessica DeWitt (jdewitt@uidaho.edu)

Responsible for documentation of Safety training

Chair of Department Safety Committee: Andreas Vasdekis (andreasv@uidaho.edu)

Responsible for overall safety procedures in the department.

5. Research Integrity Training

Responsible research practices go beyond safety, and include a variety of ethical matters with regards to research practice, publication, etc. Specific training requirements depend upon both the type of research and how it is funded. The department therefore does not have a unified research integrity training program, instead training should be provided by the faculty members supervising the research.

Links to various university-level research integrity policies are given below:

- University research protocol approval committees i.e. IRB, IACUC, IBC, Etc.
<https://www.uidaho.edu/cogs/student-resources/research/before-starting>
- The university Responsible Conduct of Research policy, plan and training requirements
<https://www.uidaho.edu/apm/45/21>
- UI’s Office of Research Assurances <https://www.uidaho.edu/research/faculty/research-assurances>
- Policies on Conflicts of Interest <http://www.webpages.uidaho.edu/fsh/5600.html> and <http://www.webpages.uidaho.edu/fsh/5650.htm>

6. Employment and Financial Support

Financial Support for graduate students comes in the following forms:

Teaching Assistantships: The university provides funds each semester to support a number of students, who are then expected to assist in the instruction of undergraduate students in various ways. This typically involves running laboratory sections for the larger introductory physics courses. These positions require about 20 hours of your time per week, and the salary is set by the College of Graduate Studies. These assistantships are allocated by the department chair, and are contingent on satisfactory performance in the relevant instructional role.

Research Assistantships: Individual faculty members may have grants to do research work that include funds to support graduate students. In these cases, the student is supported to do research work related to the specific grant, usually for about 20 hours per week during the semester. The duration, availability and salaries associated with these positions vary depending on various factors. Allocations of these positions are at the discretion of the individual faculty members with the specific grants.

Fellowships: At various times, various agencies and institutions may offer fellowships that support graduate students to work on an independent research project of their own choosing. Graduate students should talk with their Major Professor in order to identify opportunities relevant to them.

7. Code of Conduct and Conflict Resolution.

All students should be aware of the University of Idaho Student Code of Conduct, which provides expectations for students, and processes to be followed in the cases of violations:

<https://www.webpages.uidaho.edu/fsh/2300.html>

In any work environment, there will occasionally be conflicts between people. Sometimes, the people involved in the conflict can manage it themselves, but students should be aware of resources that are available to them to help manage and deal with various types of conflicts.

Conflicts between graduate students in a classroom setting or between a graduate student and undergraduate students they are instructing. In these cases, the student should communicate their concerns as soon as possible to the faculty or staff person responsible for the course.

Conflicts with graduate students in non-classroom situations, as well as conflicts with faculty members, including their advisor and/or committee members. In these situations, the student should communicate their concerns to a person that can help mediate the conflict or direct them to appropriate parties. If possible, they should talk to either the department chair or the director of graduate studies.

If the students do not feel able to talk to people in the department about their concerns, the University has an ombuds office that can help identify ways forward:

<https://www.uidaho.edu/faculty-staff/ombuds>