

## First and Second Year

### Course Requirements

Over the course of the first and second years, students are required to complete:

#### **Five foundational courses + one advanced elective + one PHYS 990: Special Investigations (SI)\* + two research seminars**

- PHYS 500; Advanced Classical Mechanics (*Year 1, Semester 1*)
- PHYS 508; Quantum Mechanics I (*Year 1, Semester 1*)
- An advanced elective or PHYS 990: Special Investigations (*Year 1, complete both in either semester*)
- Research Seminar: PHYS 515: Topics in Modern Physics Research (*Year 1, Semester 1*)
- PHYS 502; Electromagnetic Theory I (*Year 1, Semester 2*)
- PHYS 512; Statistical Physics I (*Year 1, Semester 2*)
- PHYS 608; Quantum Mechanics II (*either Year 1, Semester 2 or Year 2, Semester 2*)
- An advanced elective or PHYS 990: Special Investigations (*Year 1, complete both in either semester*)
- Research Seminar: PHYS 590: Responsible Conduct in Research for Physical Scientists (*Year 1, Semester 2*)

#### **\*PHYS 990; Special Investigations:**

- PHYS 990: Special Investigations is intended to help you identify promising areas of thesis research. To pursue an SI, you must first identify a faculty advisor for the project.
- In consultation with your advisor, you are required to write a brief proposal specifying the plan of action for the project.
- A cover page for the proposal can be found in the Physics Department Handbook under <https://physics.yale.edu/first-and-second-years> > Course requirements and suggested sequencing
- The SI proposal must be approved by the DGS. In addition, a 40-minute PowerPoint or similar presentation on the SI is required at the end of the semester to a three-person panel.
- You may want to pursue Special Investigations in different subfields to explore your research options before committing to a Ph.D. thesis topic.

### Pass-out Examination

Certain equivalent course work or successful completion of a pass-out examination may allow substitution of elective courses for individual students. To be eligible to take this exam the student must have had a more-or-less equivalent-level course elsewhere.

### Yale Graduate School Grade Format

- Honors (H); High Pass (HP); Pass (P); Fail (F)
- 2 grades of Honors – Graduate School requirement
- High Pass average – Physics Department requirement

### Required Teaching

Students in their first and second years are required to teach four semesters as a Teaching Fellow (TF) through the Teaching Fellows Program at the TF10 level (10 hrs/week)

The Poorvu Center for Teaching and Learning is a useful resource for all students in the TF program. The Poorvu Center offers workshops and courses throughout the year for the Teaching Development of Graduate and Professional Students. Consultations with staff can be arranged by request. For more information, visit the [Poorvu Center for Teaching and Learning website](#).

**International Students:** You must satisfy the University's English Language Proficiency requirement by passing the SPEAK test given by the [Center for Language Study](#).

## Registration

- ☑ All students must register for their courses online through the [Student Information System \(SIS\)](#) to access Online Course Selection (OCS).
- ☑ The DGS will then approve your course selections or notify you if they have any questions. Registration normally ends two weeks after the first day of classes for that term.

## Qualifying Exams

- ☑ Any students may take the qualifying exam at the start of their first year. If the first-year student passes the exam, it satisfies the requirement. If the student does not pass, it does not count against the student in any way or count as one of the two permitted opportunities to pass.
- ☑ The Qualifying Examination must be taken for the **first time** at the **beginning of the first semester of your second year and no later than the beginning of your third year**. It is administered the first Thursday and Friday of the semester.
- ☑ The exam consists of four independent parts, with two questions in each part.
- ☑ The parts are graded separately.
- ☑ You will have two opportunities to pass each part of the Qualifying exam. Any part(s) that you do not complete will be taken in your next attempt.
- ☑ [Examples](#) of past qualifying exams found in the Graduate Handbook.

## M.S./M.Phil Degree Petition Requirements

- ☑ M.S. (en route to the Ph.D.) – en route degree petition is optional
    - Students who complete the four courses (PHYS 500; PHYS 508; PHYS 502; PHYS 512), plus one of the following (PHYS 608; PHYS 990; or an advanced elective) all with a satisfactory record qualify for an M.S. degree. See Physics Graduate Registrar for the form.
    - If you have not petitioned for or received an en route degree (e.g. M.A., M.S., M.Phil) by the time you are admitted to candidacy, you will automatically be considered for such degrees at that time.
  - ☑ M.Phil
    - Students who have successfully advanced to candidacy (end of third year) qualify for the M.Phil. degree.
  - ☑ You can petition for your degree once you have met the requirements for the degree. Visit the Physics Graduate Registrar for the degree petition form.
    - Petition deadlines:
      - December degrees – September\*
      - May degrees – March\*
- \*exact date determined by Graduate School Registrar's office each year – refer to [GSAS Academic calendar](#).**

## Research over the summer between Years 1 and 2

Students are expected to work as an Assistant in Research in a research laboratory during the summer after their first year to gain experience in a field of potential interest.

At the end of the summer, students are expected to make a PowerPoint or similar presentation of their research. Written feedback concerning the overall performance will be provided by the summer research advisor and reviewed by the DGS.

## Qualifying Examinations

You must take the Department of Physics Qualifying Examination for the first time at the **beginning of your second semester** and **no later** than the beginning of your third semester. The purpose of this exam is to demonstrate a thorough understanding of the material within your field of study.

- Any students may take the qualifying exam at the start of their first year. If the first-year student passes the exam, it satisfies the requirement. If the student does not pass, it does not count against the student in any way or count as one of the two permitted opportunities to pass.

The qualifying examination is typically administered the **first Thursday and Friday of the semester**.

- The exam consists of four independent parts, with two questions in each part.
- The parts are graded and passed (or failed) separately.

To create, administer, and grade the Qualifying Examination, a committee will be established by the Chair.

- Both the Exam Committee and the students will be given the list of exam topics.
- Students taking the examination will remain anonymous to the committee and to the faculty (except the DGS) until the results of the examination are accepted by a vote of the faculty.

Beginning in the second semester, you will have two opportunities to pass each part of the Qualifying exam. If you fail any part(s), you only need to retake those part(s) in your next attempt.

- If you do not complete all four parts of the exam in the beginning of your second year, you will typically take an Oral exam after 2-3 months, only in the part(s) you did not complete.
- Alternatively, you may also opt to retake those part(s) of the written qualifying exam at the beginning of your third year.

[Examples](#) of past qualifying exams can be found in the Graduate Handbook.

### Grading:

- A = Performance in the top third of passing grades
- B = Performance in the second third of passing grades
- C = Performance in the bottom third of passing grades
- D = Inadequate performance
- F = Very poor performance
- The line between C and D, and D and F will be established by the committee for each of the two parts and approved by a faculty vote.

After two unsatisfactory attempts, either one written + oral, or one written + one written, the whole faculty will discuss the student, to decide if they should be allowed to continue in the PhD program

## Writing and Submitting Your Prospectus

### In the second semester of the second year or in the first semester of the third year:

- Finalize your thesis adviser and establish your Core Thesis Committee.
- Your committee should consist of **three faculty members**, including your thesis adviser. In your fourth year, you will add a fourth faculty member and an external reader.
- Consult with your core thesis committee of three and the DGS about the make-up of the final core thesis committee (including fourth member and external reader). You and your thesis adviser will select an external reader, who will be approved by the DGS.
- Graduate School Requirements:** At least two of the readers must hold faculty appointments in the Graduate School, and all readers must hold the Ph.D. degree as well as a faculty position or other appropriate qualification.
- For students in an experimental field:** Adviser and another faculty in the same experimental field; another faculty member in same field but theoretical; another experimentalist faculty member (any field)
- For students in a theoretical field:** Adviser and another faculty member in the same theoretical field; another faculty member in same field but experimental; another theorist faculty member (any field)

### In the first semester of the third year

- The first meeting between you and your core thesis committee should take place early in the first semester of the third year.
- You will present your Year 2-to-3 summer research, as well as your initial thesis research plans.
- You should meet with your core thesis committee **at least once per year** to discuss your progress.
- The goal of these closed-sessions is for the committee to assess your overall progress as a physicist.

At least once a year, in addition to the private committee meetings, you will give a presentation in a public forum to practice communicating in a public setting. The core thesis committee members are expected to attend and provide written feedback.

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Your Prospectus must be filed with the Graduate School **within six months prior to the submission of your dissertation** but typically at the **end of the second semester of your third year**.

The Graduate School offers [Graduate Writing Labs](#) that have graduate-specific resources and offers individual consultations, dissertation boot camps, and other resources to help you throughout the writing process, from drafting your prospectus to submitting the finished product.

By the time a Prospectus is submitted, the department must approve a member of the graduate faculty to serve as the primary research adviser for the dissertation.

Your prospectus should be prepared electronically in **PDF format** and include:

- A first page containing the title, your name, adviser's name, Yale University Physics Department, and date
- An abstract and a concise introduction to the subject
- Be written so that those who are not experts in your subfield can understand the topic.
- Your prospectus should be long enough to contain the essential information, typically around 7-10 pages, excluding figures and bibliography.

The prospectus should contain the following information (*excerpt from the Graduate School Programs and Policies Bulletin*):

- A statement of the topic of the dissertation and an explanation of its importance. What in general might one expect to learn from the dissertation that is not now known, understood, or appreciated?
- A concise review of what has been done on the topic in the past. Specifically, how will the proposed dissertation differ from or expand upon previous work? A basic bibliography should normally be appended to this section.
- A statement of where most of the work will be carried out—for example, in the Yale library or another library or archive, in the laboratory of a faculty member, or as part of a program of fieldwork at specific sites in the United States or abroad.
- If the subject matter permits, a tentative proposal for the internal organization of the dissertation—for example, major sections, subsections, sequence of chapters.
- A provisional timetable for completion of the dissertation.

You will present your thesis Prospectus in an oral presentation to your Core Thesis Committee **before the end of your third year.**

Before submitting to the Physics Graduate Registrar, the Prospectus must be approved by your faculty advisor and your core thesis committee.

- Department required [approval form](#)

When you submit your Prospectus, the Physics Graduate Registrar should receive the following:

- Prospectus Approval form from Core Thesis Committee
- A copy of your Prospectus

The Physics Graduate Registrar will fill out a Graduate School Qualifying Examination/Prospectus Certification form and have it signed by the DGS before sending to the Graduate School Registrar.

Helpful Resources:

- [GSAS Programs & Policies](#) - Prospectus
- [Prospectus Writing Resources](#) - Poorvu Center for Teaching and Learning

## Admission to Candidacy

The Graduate School requires all students to be admitted to candidacy by the **end of the third year**.

You are recommended for admission to candidacy if you:

- Completed your course requirements with satisfactory grades – a High Pass average and the Graduate School requirement of two Honors (can include PHYS 990)
- Passed the qualifying examinations
- Submitted an acceptable thesis prospectus (approved by your faculty adviser and Core Thesis Committee)

The Physics Graduate Registrar will assist in helping the DGS file the necessary form for your Admission to Candidacy to submit to the Graduate School.

This form will have the name of your dissertation adviser and certify that you have met the department requirements.

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Within **30 days** after you are admitted to candidacy, you will work with your thesis adviser to complete your **initial** Dissertation Progress Report (DPR).

The Graduate School will send out a reminder every year to fill out your DPR.

- Your initial report will include your future research plan (from the time you advanced to candidacy to April 1)
- You can find access to the DPR here: <https://registrar.yale.edu/dpr>

On **April 1**, you will work with your thesis adviser to complete your first **full** Dissertation Progress Report, indicating the status of the research plan you submitted and your research plan for the following year.

Please note:

- Training in teaching can occur both before and after you are admitted to candidacy.
- At the time of your advancement to candidacy, if you have not petitioned for or received an en route degree (e.g. M.A., M.S., M.Phil), you will automatically be considered for such degrees.
- If you are not admitted to candidacy at the expected time, you will not be permitted to register for the following term.

Continue to work on your dissertation research and take advantage of the resources provided to you by the department and the Graduate School.

Whether you are just beginning to write your dissertation or preparing to finalize and submit, you should consult the Formatting Guide: <http://gsas.yale.edu/academic-requirements/dissertations>, to make sure you are following the Graduate School requirements.

The Graduate School offers [Graduate Writing Labs](#) that have graduate-specific resources and offers individual consultations, dissertation boot camps, and other resources to help you throughout the writing process, from drafting your prospectus to submitting the finished product.

## Writing and Submitting Your Dissertation

Beginning in the fourth-year, all students and their advisers must complete a Dissertation Progress Report (DPR) by **May 1st** of every academic year before submitting the final dissertation. The Graduate School sends out a reminder every year to fill out your DPR.

- ☑ <https://registrar.yale.edu/dpr>

Whether you are just beginning to write your dissertation or preparing to finalize and submit, you should consult the Formatting Guide: <http://gsas.yale.edu/academic-requirements/dissertations>, to make sure you are following the Graduate School requirements.

The Graduate School offers [Graduate Writing Labs](#) that have graduate-specific resources and offers individual consultations, dissertation boot camps, and other resources to help you throughout the writing process, from drafting your prospectus to submitting the finished product.

You should meet with your thesis adviser throughout the writing process at least once a year to discuss your progress.

### The First Chapter

It is recommended that the first chapter of the thesis be a short summary of the entire thesis; including:

- ☑ Brief review of the field prior to the thesis research to provide context
- ☑ A presentation of the goals and motivations of the thesis research
- ☑ A clear description of what you have achieved in the thesis research. This description should refer to your “brief review of the field prior to the thesis research” and clearly indicate the relation to prior work.
- ☑ Suggestions for how to best build upon the thesis research in future work (optional in first chapter – otherwise, these suggestions should appear in the conclusion of the thesis.)

Remember to work with your thesis adviser to submit your DPR, sent out by the Graduate School, at the end of every year while you continue your dissertation research.

### When You Are Ready to Submit Your Dissertation

- ☑ Once you and your thesis adviser agree that you are ready to submit your dissertation, you will need to notify the department of your intention to submit, defend your dissertation, and submit the final product after reviewing the GSAS Dissertation Checklist.

### Intent to Submit:

- ☑ At least four weeks prior to the dissertation submission deadline (typically the end of August for a December degree and mid-February for a May degree), notify the Physics Graduate Registrar of your intent to submit your dissertation, either by visiting the office (SPL 35A) or by email. This will give the Registrar time to notify and initiate the reader process in advance of the dissertation submission deadline.
  - See GSAS Academic Calendar for exact deadlines: <https://gsas.yale.edu/academic-events>

### Dissertation Defense

- ☑ You will defend your dissertation to the internal members of your committee.
- ☑ Set the time, date, and place for the defense at a time that works for all members of your Core Thesis Committee.
- ☑ Copies of the dissertation draft should be given to the members of the Core Thesis Committee at least 3 weeks in advance.
- ☑ The dissertation defense will consist of two consecutive parts

- The first part is open to anyone interested. It will consist of an oral presentation of approximately one-hour in length, in the style of a research seminar.
- The second part will be restricted to the members of the committee. It will consist of detailed questioning of the candidate by the dissertation committee.
- ☑ The Graduate School will send dissertation out to the external reader after the oral defense and official submission.
- ☑ After the oral defense, you may have some changes to make before you submit to the Graduate School.

### Submitting the Final Product to the Graduate School

- ☑ You can find submission guidelines posted online at the Graduate School's website – carefully read through the Dissertation section of *Programs and Policies*. This will answer many questions about the process.
- ☑ Review the GSAS **Dissertation Checklist**: [https://gsas.yale.edu/sites/default/files/page-files/dissertation\\_2019\\_3.pdf](https://gsas.yale.edu/sites/default/files/page-files/dissertation_2019_3.pdf)
- ☑ Be aware of deadlines – **do not submit late and be sure to submit a hard copy**. Be sure to submit all appropriate forms with your unbound hard copy (see Dissertation Checklist).
- ☑ You can find deadlines for the year on the [GSAS Academic Calendar](#). For a December degree, the submission deadline is usually in early October. To be awarded a May degree, the dissertation must be submitted in mid-March by 4 pm on the due date.

### Petitioning for Extension/Dissertation Completion Status

If you wish to extend your registration beyond your original sixth year, you must file for a 7<sup>th</sup> year extension; the paperless form can be found here: <https://registrar.yale.edu/forms-petitions> or through the Physics Graduate Registrar.

A dissertation progress report must also be completed along with a letter to the DGS stating the reasons for needing an extension. This extension can be requested for one or two terms.

It is not necessary to be a registered student beyond your sixth year to have a dissertation defense and be able to submit; however, you will not be allowed to receive AR salary as a student, nor would you have health insurance if you were not registered.

If you have already been registered for 12 terms, you might consider moving to Dissertation Completion Status while completing your dissertation. Paperless form found here: <https://registrar.yale.edu/forms-petitions>