

# Graduation with Distinction in Physics or Biophysics

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The Physics Department offers an honors program that can lead to graduation with distinction or with high distinction based on academic excellence and on excellence in research as judged by a committee of physics faculty. The honors program requires writing a senior thesis followed by defending the thesis. These requirements and procedures apply to both Physics and Biophysics degrees.

A Physics major can also graduate with Latin honors, which is based on the student's grade point average and does not require any research. Details about Latin honors can found on the Registrar's webpage Academic Recognition and Honors.

Students doing senior theses may wish to register for Physics 495, an independent study course. However this is not required. Completing the requirements for Physics 495 also does not automatically lead to graduation with distinction.

## Requirements for Graduation with Distinction

To graduate with **distinction**, the student must

- 1 Identify a faculty mentor who will guide the student in research.
- 2 Fill out an Intent to Graduate with Department Distinction form and get signed approval of the form from the Director of Undergraduate Studies. (Note that if student is taking a thesis independent study course, a separate independent study form is required to register for this course.)
- 3 Complete all requirements for the B. A. or B. S. degree in physics.
- 4 Finish the senior year with an overall grade point average of at least 3.0.
- 5 Finish the senior year with a grade point average based on physics courses of at least 3.0.
- 6 Complete a substantial research project under the guidance of a faculty member.
- 7 Document the research in the form of a carefully written thesis that is consistent in style and quality with a published journal article.
- 8 Orally present and defend the thesis during a two-hour exam that is administered by a thesis committee that consists of three faculty members. This defense must take place one week before the final day of classes for the spring semester. The committee must vote unanimously to award honors (distinction).
- 9 We expect students doing senior theses to present a poster summarizing the thesis research at the annual student poster session of the Physics Department. The poster session usually takes place the week during which spring classes end.

To graduate with **high distinction** the thesis committee must further unanimously agree by vote that the work done by the student, as demonstrated

during the oral defense and by the written thesis, represents exceptional quality and originality.

## **Timeline and Deadlines**

The following timeline indicates deadlines for different milestones. Each of the bold deadlines must be met in order for the student to graduate with distinction. A Dean's excuse is required for missed deadlines. The specific dates will be given for each semester here. This timeline refers to spring graduation; dates will be correspondingly shifted for fall graduation.

<b>Deadline/Target Date</b>	<b>Activity</b>
Spring of sophomore year (recommended)	Contact professors, begin research
No later than spring of Junior year	Identify research advisor
Summers, and/or Junior year (recommended)	Research work
<b>Fall drop/add of Senior year</b>	Intent to graduate with distinction form approved by DUS
Fall semester of Senior year	Thesis research work
<b>Fall last day of classes</b>	Committee formed and approved by DUS
<b>Spring Drop/Add</b>	Thesis outline and abstract submitted to DUS and committee
<b>Friday before Spring Break</b>	Defense scheduled and room reserved
<b>Friday before Spring Break</b>	Thesis draft to DUS and committee
<b>Monday after Spring Break</b>	Feedback from committee. Worksheets A, B submitted to DUS and given to student
<b>Two weeks before defense</b>	Next draft to committee. Worksheet C submitted to DUS and committee by student
<b>One week before last day of classes</b>	Thesis must be defended, and worksheets D, E submitted to DUS
<b>Last day of classes</b>	Final draft of thesis submitted to DUS

## Rubrics

Rubrics are provided in the following worksheets, to be submitted to the DUS:

- *Worksheet A*: to be filled in by the committee members by the end of spring break and given to the student and DUS.
- *Worksheet B*: to be filled in by the supervisor by the end of spring break and given to the student and DUS.
- *Worksheet C*: to be filled in by the student and submitted to the DUS and committee.

- *Worksheet D*: to be filled in by the committee members after the defense and submitted to the DUS.
- *Worksheet E*: to be filled in by the supervisor after the defense and submitted to the DUS.

## The Honors Senior Thesis

The following describes the details of the honors senior physics thesis.

The thesis is a written document that summarizes and explains the thesis research for a committee of three faculty who will evaluate the quality of the research, the quality of the thesis, and the student's understanding of the thesis as demonstrated during an oral thesis defense. The committee will then decide on whether to award honors and what kind (honors or high honors).

The thesis should be between 30-70 pages long. (Most physics theses are less than 50 pages.) It should be written in the style of a journal article with a title, abstract, introduction, discussion of methods, discussion of results, a conclusion, and acknowledgements. The student should cite all related and prior work and include a list of references in a bibliography at the end of the thesis. It should conform to

the conventions of the research subfield. Special attention should be given to writing the title, abstract, opening paragraphs of the introduction, and the conclusions since these are what most people read first and read most carefully. In particular, it is important for the student to identify and to state clearly in the abstract and in the conclusions what the student did and in what ways the results of the thesis are new, significant, or interesting to physicists. The ideal audience for the thesis is Duke physics seniors, so the student should write his or her thesis so that most of it can be understood by this peer group.

Examples of recent Duke physics abstracts and these can be found [here](#) and a student should look at several of these theses at an early stage, to get an idea of the style of writing and how a thesis is organized.

Although it is not a requirement, students often complete the research project as part of the course PHY 495, "Thesis Independent Study". To achieve honors, especially high honors, a student should plan on spending at least a full year on the thesis work, with an effort corresponding to about ten hours per week over that time. Regular meetings with the faculty mentor should be scheduled (approximately once per week).

## The Honors Senior Defense

The honors thesis defense is an oral examination that involves a student giving a 30-minute presentation to a committee of faculty that will then evaluate the quality of the thesis work and of the student's understanding of his or her thesis work. The committee will then vote on whether the student has obtained honors and, if so, award honors or high honors.

The defense must be held no later than one week before the last day for undergraduate classes during the semester the student intends to graduate. A final version of the thesis must be submitted to the DUS in PDF format before the end of the examination period of that same semester.

The thesis defense will last no longer than two hours. The student should plan on speaking for no longer than 30 minutes (without interruptions), which should correspond to no more than 18 presentation slides. The remaining time will involve the committee asking the student questions about the thesis and for discussion (in the student's absence) about whether to grant honors and what kind.

An abstract and outline should be submitted by drop/add of the spring semester. A first draft is due on the Friday before spring break. The final draft is due by the last day of classes of the spring semester. For students graduating early, the dates

will be shifted accordingly.

The defense is usually closed, but other students or visitors may attend the presentation portion if the student *and* all of the committee members agree.

The student is strongly recommended to practice his or her thesis presentation at least once with the thesis advisor and research group before the actual defense.

### **Responsibilities of the student:**

It is the responsibility of the student to make all arrangements for the defense in consultation with the faculty advisor. These responsibilities include:

- Finding three committee members to be on the thesis committee and emailing the membership of the committee to the Assistant to the DUS for approval by the DUS. The committee chair is the student's advisor; the DUS (or the Associate DUS for Biophysics, for Biophysics theses) will often (but not always) serve on the committee. The student should request one or two additional faculty members to serve on the committee. Any faculty member at Duke may serve, although at least two should have appointments in Physics. Non-faculty members with Ph.D.s involved in supervising students (e.g., research associates) may also serve on the committee, but there must at least three faculty members. It is preferable for at least one committee member to have expertise outside of the subfield represented by the thesis topic. The committee must be approved by the DUS by the last day of classes of the fall semester.
- Finding a time when all committee members can meet for the two-hour defense, on a date no later than the last day of classes.
- Reserving the meeting room with the help of the Assistant to DUS. The defense date must be set and the room reserved by the Friday before spring break.
- Arranging for audio-visual equipment, if necessary.
- Distributing a copy of the thesis to the committee members before spring break.
- Distributing the revised thesis and response to feedback (worksheet C) to the committee members for approval at least one week before the defense.

### **Responsibilities of the research supervisor:**

- Arranging for weekly meetings and giving regular guidance and feedback.
- Providing feedback on the outline and abstract.
- Providing timely feedback on the thesis using worksheet B.
- Chairing the defense.
- Approving the final thesis.

- Final submission of worksheet E to DUS.

**Responsibilities of the committee members:**

- Providing feedback on the outline and abstract
  - Providing timely feedback on the thesis using worksheet A
  - Attending the defense
  - Approving the final thesis
  - Final submission of worksheet D to DUS
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