

# PHYSICS, PHD

The PhD degree in physics provides the academic foundation and laboratory training to conduct high quality research at the frontiers of physics. Graduate students from diverse backgrounds become creative physicists with the skills to thrive in educational, industrial or government laboratory settings.

## Requirements

### Course Work

At least 48 credits of graduate courses must be completed.

#### Required Courses

Course ID	Title	Credits
PHYS 6010	Techniques Theor Phys I	3
PHYS 7060	Theoretical Mechanics	3
PHYS 7100	Statistical Mechanics	3
PHYS 7170	Quantum Mechanics I	3
PHYS 7180	Quantum Mechanics II	3
PHYS 7230	Electromagnetic Theory I	3
PHYS 7910	Research I	3
PHYS 7920	Research II	3
PHYS 7930	Research III	3
PHYS 7940	Research IV	3

Elective courses (18 credits): The remaining 18 credits should be graduate level physics electives, or graduate level courses in a related field with approval of the research supervisor and graduate program advisor. One of the electives must be a computational course (PHYS 6170 Computational Physics and Engineering, MPEN 6290 Computational Materials Science and Engineering, or a computational course in another department approved by the graduate program advisor). Up to 6 credits may be fulfilled by Advanced Research I and II, with approval of the research supervisor and graduate program advisor. Advanced Research I and II may be taken at the same time as Research I-IV, with up to 6 credits of research allowed in one semester.

## Grades

Per the SSE Handbook: "A course in which a grade of C+ or less is earned cannot be counted toward a graduate degree. If a student receives one B- grade, the student is immediately considered for probation by the Associate Dean for Graduate Studies in consultation with the appropriate department/program. If a student receives two grades of B-, or one grade less than B-, during his/her tenure in the School of Science and Engineering, the student is placed on probation and considered for dismissal by the Associate Dean in consultation with the appropriate department/program."

A student who does not maintain the minimum 3.0 GPA in graduate course work will be subject to disenrollment.

## Written Qualifying Exam

The Ph.D. qualifying exam is a 6-hour written examination covering classical and modern physics, given by the department once per semester. It covers the typical U.S. undergraduate physics curriculum with an emphasis on classical electrodynamics and quantum mechanics. The qualifying exam must be attempted no later than the fourth semester of graduate study. Students who are sufficiently prepared may take it during the first year with approval of the research supervisor. The passing score is 60%. Students who fail the qualifying exam must retake it until passed. Students may attempt the qualifying exam up to three times. Any student who has not passed the qualifying exam by the end of the fifth semester of graduate study will be disenrolled from the program.

Students who have met course requirements and passed the qualifying exam may apply to become degree candidates.

## Faculty Dissertation Committee

Prior to the prospectus defense, the student and research supervisor form the faculty dissertation committee, which consists of the research supervisor (chair) and at least two other faculty members. One member may be from another Tulane department or other appropriate institution. The faculty dissertation committee (henceforth the committee) examines the student at the prospectus defense and oral dissertation defense, and approves the final written dissertation.

## Prospectus Defense

The prospectus defense demonstrates to the committee that the student has acquired sufficient knowledge in the specific research area and can effectively express that knowledge orally and in writing. A student must pass the written qualifying exam before undertaking the prospectus defense. The prospectus defense consists of a written proposal and an oral defense:

The written research proposal (10-15 pages) contains an introduction, proposed research and justification, methods, preliminary results, and discussion. It must be reviewed and approved by the committee before the end of the sixth semester of graduate study.

The oral defense is a two-hour oral examination, including a research presentation (about 45 minutes) prepared by the student, given by the committee. The examination includes specific questions about the student's research as well as broadly focused questions on the general area of research. The oral defense must be attempted following approval of the written proposal, no later than the sixth semester of graduate study. If failed, the student is normally given a second attempt in the following semester. After two failures the student will be disenrolled from the program (exceptions due to extenuating circumstances may be granted by vote of the faculty).

Students who are sufficiently prepared are strongly encouraged to take the prospectus defense before the end of the 4th semester of graduate study.

It is expected that, after completion of the oral prospectus defense, the Ph.D. candidate will obtain a Research Assistantship (RA) in the same research group. In order to encourage this, the faculty have adopted a policy for allocating graduate students on TA's to research groups.

## Annual Report

In April of each year, every Ph.D. student will submit a brief annual progress report (1-2 pages) to the research supervisor (and committee, when formed) summarizing research progress and accomplishments over the previous year, and future plans and milestones. This requirement is waived in the years when the prospectus and thesis defenses are completed.

## Dissertation

The final requirement for the Ph.D. degree is a written dissertation based on original research, approved by the committee, and its defense in an oral exam by the committee.

## Master's Degree

The master's degree is not a requirement for the Ph.D. in physics. Admission with financial aid is only for doctoral students. However a graduate student may receive an M.S. in Physics based on 30 hours of approved graduate credit, or (if the research supervisor agrees to offer this option) an M.S. in Physics based on 24 hours of approved graduate credit plus a thesis deemed acceptable by the research supervisor. Research course credit does not count toward the M.S. in Physics degree.

## Program Transfers

Students in the Physics Ph.D. program cannot transfer to the Materials Physics and Engineering Ph.D. program without going through the regular admissions process.

**Exceptions to the requirements, due to extenuating circumstances, may be granted by vote of the PEP faculty.**

**The Physics program requirements were last modified in Fall 2018. The requirements for students matriculating prior to Fall 2018 may be found here (<https://tulane.box.com/s/ovwi03w8wmdq7e75m90okkizbqiu86te/>).**