Requirements for the Ph.D. Degree in Materials Physics and Engineering

Course work:

At least 48 credits of graduate courses must be passed with a grade of B or higher.

Required courses (36 credits, each course is 3 credits):
PHYS 6010 Theoretical Physics I
PHYS 7100 Statistical Mechanics
PHYS 7170 Quantum Mechanics I
PHYS 7230 Electromagnetic Theory I
PHYS 6350 Kinetics of Material Systems
PHYS 6360 Structure of Materials
CENG 6110 Thermodynamics and Properties of Matter
PHYS 6170 Computational Physics and Engineering
PHYS 7910 Research I
PHYS 7920 Research II
PHYS 7930 Research III
PHYS 7940 Research IV

Elective courses (12 credits): Nine of the remaining 12 credits should be graduate level physics or materials electives, or graduate level courses in a related field with approval of the research supervisor and graduate advisor. The remaining three elective credits should be a graduate level elective from the Chemical and Biomolecular Engineering or Biomedical Engineering departments.

Grades:

The minimum satisfactory grade in a graduate course is B. A grade of C+ or less is not passing and the course must be repeated for credit toward a Ph.D. or M.S. degree. A grade of B- is considered an unsatisfactory but passing grade, so it counts toward the degree but may trigger academic probation or other consequences determined by the graduate advisor and/or the dean. A student who does not maintain the minimum 3.0 GPA in graduate course work will be subject to disenrollment.
Qualifying Exam:

The Ph.D. qualifying exam is a 6-hour written examination covering physics and materials science and engineering, given by the department once per semester. Half of the exam covers the typical U.S. undergraduate physics curriculum with an emphasis on classical electrodynamics and quantum mechanics. The other half of the exam covers the typical U.S. undergraduate materials science and engineering curriculum at the level of Callister’s “Materials Science and Engineering: An Introduction”, with emphasis on structure, kinetics, thermodynamics, and properties (e.g. electrical, mechanical, optical) of materials. The qualifying exam must be attempted no later than the fourth semester of graduate study. Students who are sufficiently prepared are strongly encouraged to take it during the first year. The standard passing score is 60%, subject to modification by vote of the faculty. Students who fail the qualifying exam must retake it until passed. There is no limit on the number of attempts. 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 (exceptions due to extenuating circumstances may be granted by vote of the faculty).

Students who have met course requirements and have passed the qualifying exam become degree candidates. Those who have not are required to attend the weekly departmental colloquium.

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 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 early.

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.

**Computer Proficiency:**

Each graduate student must demonstrate to his/her research advisor an acceptable level of proficiency in computer programming.

**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.

**Masters Degree:**

The master's degree is not a requirement for the Ph.D. in Materials Physics and Engineering. 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 I-IV credit does not count toward the M.S. degree.