

# Physics Department Preliminary Examination Procedures

Passed November 26, 2013

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## Statement of Purpose

The preliminary examination will cover a range of core topics in undergraduate physics. The examination serves a number of purposes:

1. By passing the examination, students demonstrate mastery of undergraduate physics.
2. The process of studying for the preliminary examination is critical for synthesizing the topics in physics into a coherent perspective.
3. By working through problems on previous examinations, the student identifies weaknesses, and overcomes these by learning key concepts and practicing the methods that lead to solutions. This process provides significant preparation not only for the examination, but for research as well.
4. The results from the examination are a useful diagnostic for faculty advising students.

In order to fulfill the purposes of the examination, the student should expect to allot regular time to study that typically spans one semester.

## Examination Format

The preliminary examination will be administered twice during the academic year, usually during the first week of class in the fall and spring semesters. It will cover a range of topics normally encountered in core undergraduate physics courses. The examination will be given in three sections:

- Mechanics, thermodynamics, statistical mechanics
- Electricity & magnetism, optics
- Quantum mechanics, atomic & nuclear physics

Some topics—such as relativity, mathematical, and experimental physics—are suitable for any category and will be included throughout the examination. Though many of the problems will involve problem solving, students must also be able to discuss important concepts or key results in pivotal experiments.

Each section will have 6 questions and will be given on a different day, usually Monday, Wednesday and Friday of the first week of class. The time allotted for each section will be 4 hours.

## Passing Specifications

Passing the examination at the appropriate level is required for a graduate degree in physics. Students who fail to pass at the appropriate level within the time line specified below will be ineligible to receive a degree from our department, and will be disenrolled from the program.

- Students pursuing an MS must pass at the 40% level.
- Students pursuing a PhD must receive either
  - 60% for an “unconditional PhD pass”, or
  - at least 55% for a “conditional PhD pass”

In a “conditional PhD pass,” results from the examination will be used to diagnose deficiencies in the student’s core knowledge. Conditions for a complete pass will be specified by the Graduate Studies committee, subject to approval by the department. Some example conditions are:

- Grade for an upper level course in the area of deficiency.
- Take and achieve a specified grade in a course in the area of deficiency.
- Directed study in which student writes a paper or completes a research project in the area of deficiency.
- Oral examination covering material in deficient area.

If the student does not meet the conditions specified by the Graduate Studies committee, they will be ineligible to receive a PhD.

## Time line

- *All* students—MS and PhD degree seeking students—entering the program without a previously earned MS in *physics* are expected to pass with a 40% by the beginning of their third semester (usually the fall semester of their second year).
- Students pursuing a PhD—and who don’t already have an MS in physics—are expected to receive an unconditional or conditional PhD pass by the beginning of their fourth semester.
- Students pursuing a PhD who already have an MS in physics are expected to receive an unconditional or a conditional PhD pass by the beginning of their second semester (usually the spring semester of their first year).

Students are strongly encouraged to take the examination during each offering so that they may identify deficiencies requiring improvement for subsequent offerings. While it is not required, students may elect to take the examination upon entering the program (during the first week of their first semester).

Under certain circumstances, students with a weaker background may require remedial work in physics. These students are identified in the admission process or during their first semester. They will be informed at that time that we expect their first year to be spent in preparation for the full graduate curriculum. The preliminary examination time line for these students begins in their third semester (usually the fall semester of their second year), when they engage in the full graduate course sequences. However, they may elect to take the examination as a diagnostic tool during their first year; passing at the appropriate level during this first year satisfies the preliminary exam requirement.

In extreme conditions (such as severe illness or an emergency situation), the department may approve an extension for the preliminary examination time line.