

# The Physics Graduate Qualifying Exam

May 2025

## 1 Introduction

The Physics Department has adopted a policy for written qualifying examinations, to be given in August and January of each year. The exam covers four major subject areas at the undergraduate level:

1. Classical Mechanics
2. Quantum Mechanics
3. Electricity and Magnetism
4. Statistical and Thermal Physics

An official departmental exam policy was drafted by the Graduate Curriculum Committee and adopted by the Faculty. The present document sets forth the format, content, and grading of the exam formulated by the Exam Committee. The exam provides an opportunity for students to demonstrate competence in Physics at the undergraduate level. Hence, educators would describe it as a summative assessment.

## 2 Format

The Qualifying Exam is offered in two parts, each covering two of the four subject areas each

Part A in August covers Classical Mechanics and Quantum Mechanics.

Part B in January covers Electricity and Magnetism, and Statistical/Thermal Physics

Each part will be administered over two successive days, with each of its subject areas tested in a single 3.5-hour session. Each subject area will consist of **three problems**. All problems will be at the upper division undergraduate level, similar to questions that might be encountered in an undergraduate setting. Problems will emphasize core concepts of the subject area, which are listed in a separate document prepared by the committee.

Calculations are important, but are not intended to be long or tedious. Because the committee wishes to maximize the opportunity for formative assessment, we encourage students to attempt all three problems in each subject area. We also encourage students to verify their answers carefully.

Disability accommodations will be provided for students who require them, consistent with MSU policy. Students are strongly encouraged to attempt each subject area that they have not yet passed. The committee aims to allow ample time and provide an opportunity for undisturbed concentration. Students are expected to arrive on time, but may leave whenever they are finished. The committee will request a location that is spacious, well lit, quiet, with restrooms nearby.

### 3 Grading

The exam is passed by subject area. Each problem is worth 10 points. To pass the subject area, two of the three problems must receive a score of 7 or higher, and the lowest score out of three problems will be discarded. External factors will not be considered. Student responses are expected to be clearly written and justified. Partial credit will not be awarded when answers appear without any work or when the work is illegible to the grader. Each student's exam shall be clearly labeled with a unique, anonymous identifier on all pages. This facilitates anonymous grading and ensures that each student's work is kept together. The exams will be scanned to facilitate grading simultaneously and for archival purposes.

Two faculty members will grade each problem independently. They will then confer to reconcile their scores and comments. While we will not publish a detailed grading scheme, our general philosophy is to reward demonstrated conceptual understanding and minimize deductions for unimportant mistakes (e.g., transcription errors).

The exam takers shall receive the results of the exam no more than **seven** days following the last examination date. They will receive scores for each question as well as pass/fail status in each attempted subject area, along with copies of their exam papers with each problem clearly scored and marked. The graders will strive to provide clear feedback. Research advisors will be informed of their students' pass/fail status in each subject area. Solutions will be released in the same timeframe. Exam grades are at the sole discretion of the committee.

A student may request a regrade when a grading error has been identified. A regrade request must include clear written explanation of the grading error. It must be submitted to the Department (not directly to the exam committee) within **three business days** after the exam has been returned to the student. The Department will transmit the request anonymously to the committee using the aforementioned anonymous identifier rather than student's name. Procedures for evaluating regrade requests are at the committee's discretion. Only after all regrade requests have been evaluated will the outcome of the exam be final.