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## Definitions and Terms

**Advisor:** Once a student has submitted their declaration of advisor form, their chosen advisor, normally a member of the Physics Department faculty (but can instead be a faculty member from another department or a researcher at LBNL), becomes the student's supervisor overseeing their GSR work and their progression towards completion of their PhD.

**Exam Writers:** Faculty members of the Preliminary Examination Committee whose role is to each create one section of the exam, proctor that section, oversee its grading and meet with students and mentors as necessary to provide structural support as students prepare to retake the exam.

**GSAO:** Graduate Student Affairs Officers are staff advisors assigned to monitoring the progress of, and providing support and resources to, our PhD students in the Department of Physics. There are two GSAOs in Physics currently: Ariana Castro (lead GSAO) and Marjani Jones. Their work supplements the mentoring and advising done by members of our faculty.

**Mentor:** Prior to a student submitting their declaration of advisor form and commencing research, the student's progress is monitored by a mentor, who is a member of the Grad Mentoring Committee. Mentors serve as advocates and can provide advice to their mentees on the methods and approaches for passing prelim exams.

**Passing Threshold:** The minimum passing score on an individual section, as determined by the exam writer.

**Prelim Readers:** Graduate students identified and hired by the department, typically for only the first few weeks of each semester, responsible for developing exam rubrics and grading the exams. Their paid positions are held confidential, and they should have already passed the qualifying exam. They also handle administrative tasks related to the exam, such as scanning

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and uploading to Gradescope. Prelim Readers may be asked to proctor DSP students taking the exam in another room.

**Prelim Tutors:** Graduate students identified and hired by the department, typically for only the first few weeks of each semester. They should have already passed the preliminary examination. Tutors are responsible for holding review sessions for students preparing to take their preliminary examination. Prelim Tutors may be asked to proctor DSP students taking the exam in another room.

**Preliminary Examination:** Also called “prelims” and “prelim exam” is a written exam composed of four sections, grouped by general subject areas of undergraduate physics.

**Preliminary Examination Committee:** A department committee made up of members of the faculty and staff, appointed by the Department Chair on a calendar year schedule (Spring-Fall), whose responsibility is to create and oversee the delivery of the preliminary examination each semester.

**Primary Exam Period:** Begins at the start of semester and ends with the point the students are notified of their scores and outcome.

**[Problem Bank](#):** The Department’s prelim problem bank is a collected set of past preliminary exam problems accessible by students with their Calnet login, designed to help students prepare for taking the exam. A majority of preliminary examination questions are pulled from this bank.

**Reflection and Resubmission:** An approach for completing one or more sections of the preliminary examination in the secondary exam period, available only for students that do not pass by a narrow margin; focuses on a student reviewing and correcting their submitted work in preparation for a follow-up assessment.

**Secondary Exam Period:** Begins after students are notified of their scores and outcome, and ends the last day of classes in that semester. The exception is in the case where a student is instructed to enroll in a semester-long undergraduate course after their second attempt. The final assessment may be given, in this case, after the completion of that semester.

**Section:** One of the four general subject areas that are assessed by the prelim exams.

**Start of Semester:** First day of semester according to the Academic Calendar

**Targeted Study:** An approach for completing one or more sections of the preliminary examination in the secondary exam period which focuses a student’s study efforts on an identified weakness within a single section of the exam, in preparation for a follow-up assessment.

## Timing

**Summer** - Access to the problem bank is offered in the orientation email to incoming students. Once students have set up their Calnet ID, they will have access to the problem bank.

**Primary Exam Period** - All four sections of the preliminary examination are offered at the beginning of both Fall and Spring semesters.

- Two sections are offered the first weekend at the start of semester
- Two sections are offered the second weekend at the start of semester

Exams are graded within two weeks of the section exam date.

Scores and thresholds are released once all four sections have been graded, normally within three weeks.

**Secondary Exam Period** - Once students have received their prelim score, students that failed one or more sections of the exam can work with their faculty mentor and/or exam writer to prepare to take the exam in the next semester, or engage in a Reflection and Resubmission process, or a period of Targeted Study, if they qualify.

The Department expects students to pass the examination within the first three semesters of graduate study (see further notes on this below).

## Overview

The preliminary examination, also called “prelims”, is designed to ensure that students command a broad spectrum of undergraduate physics to prepare them for graduate research. The preliminary exam is a written exam composed of four sections, grouped by general subject areas of undergraduate physics. All four sections of the preliminary examination are offered at the beginning of both Fall and Spring semesters. A student who has passed all four sections of the written exam will have passed the preliminary examination. The Department expects students to pass all four sections of the preliminary examination within the first three semesters of graduate study (see further notes on this below).

Passage of the preliminary exam is one of multiple indicators of a student’s preparedness for research and is intended as one tool for helping the Department evaluate whether a student is making adequate progress towards their Ph.D. The determination of a student’s academic standing in the Department will be based on a student’s entire record, including performance on the prelim exam, undergraduate coursework, graduate coursework, and research performance where appropriate.

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Students are expected to follow a schedule to meet the preliminary examination requirements.<sup>1</sup> They are encouraged to take all four sections of the written exam in their first semester and are required to attempt all four sections no later than their second semester primary exam period. Students are expected to pass all four sections within the first three semesters of their graduate study. Any exceptions or deviations from this standard schedule must be approved in advance by the Head Graduate Advisor, except those due to illnesses or emergencies. As soon as a student becomes aware of an illness or emergency that might prevent them from completing their preliminary examination requirement on schedule, they should notify the Head Graduate Advisor as soon as is practical. Completion of all sections of the exam not affected by the revised schedule should proceed normally.

The preliminary examination process is implemented by the faculty preliminary exam committee. The Graduate Student Mentoring Committee also works with both students and the Preliminary Exam Committee to help students make good progress towards meeting the preliminary examination requirement. Faculty mentors are assigned to students who have not yet submitted a declaration of advisor, and should meet regularly with their mentees, providing guidance as the students begin to establish themselves within a research group. Serving as advocates, mentors can offer valuable advice on methods for preparing and successfully passing prelim exams. Their support is essential in helping students navigate the early stages of their graduate studies. The department's Head Graduate Advisor, Academic Coordinator, Vice Chair for Academics, Chair, and other staff members are also involved in various aspects of the process.

## The Preliminary Exam

The preliminary exam has four sections, covering (1) classical mechanics, (2) electromagnetism and optics, and special relativity, (3) thermodynamics and statistical physics, and (4) quantum mechanics. Note that these divisions do not preclude the possibility of questions on one section that draw from subject matter emphasized in a different section. (For example, a question that touches on thermodynamics may appear in the quantum mechanics section.)

Each section covers traditional, textbook-style problems, as well as more comprehensive questions that specifically test physical and numerical insight. These may include order-of-magnitude estimates involving physical constants and analyzing physical situations by applying general principles rather than performing complex calculations. Each section is given as a three-hour written exam on a different day over the course of two weekends. A student who passes any section of the written exam need not retake that section

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<sup>1</sup> Students that need accommodations for a disability should work through the DSP office to seek official accommodations requests. DSP accommodations will be honored to the best of our ability.

## Preparation for Taking the Exam

Students are strongly encouraged, but not required, to attempt the examination during their first semester. However, they are expected to have attempted all written sections by the end of their second semester. If a student is not planning to take a given section of the preliminary examination in their first semester, they should meet with their graduate mentor to either confirm they will take it in their second semester or share their study plan, such as enrolling in the associated undergraduate course prior to retaking the exam.

Students have access to a preliminary exam problem bank maintained by the department's academic coordinator. They are encouraged to review and study these problems before taking the exam, as this will help them assess their level of preparation. If a student lacks confidence in their readiness, they should meet with their graduate mentor to discuss a study and preparation plan.

The student is encouraged to contact their mentor, or research advisor if the student has declared one, to seek guidance and advice on the preparation for passing the exams. In particular, if the student is asking for a delay in the exam completion, they should work with their mentor or declared advisor to establish a timeline and a plan for completing the exam requirement in a timely way. All modifications to the standard prelim timeline require approval by the Head Graduate Advisor.

## Department's Implementation of the Exam

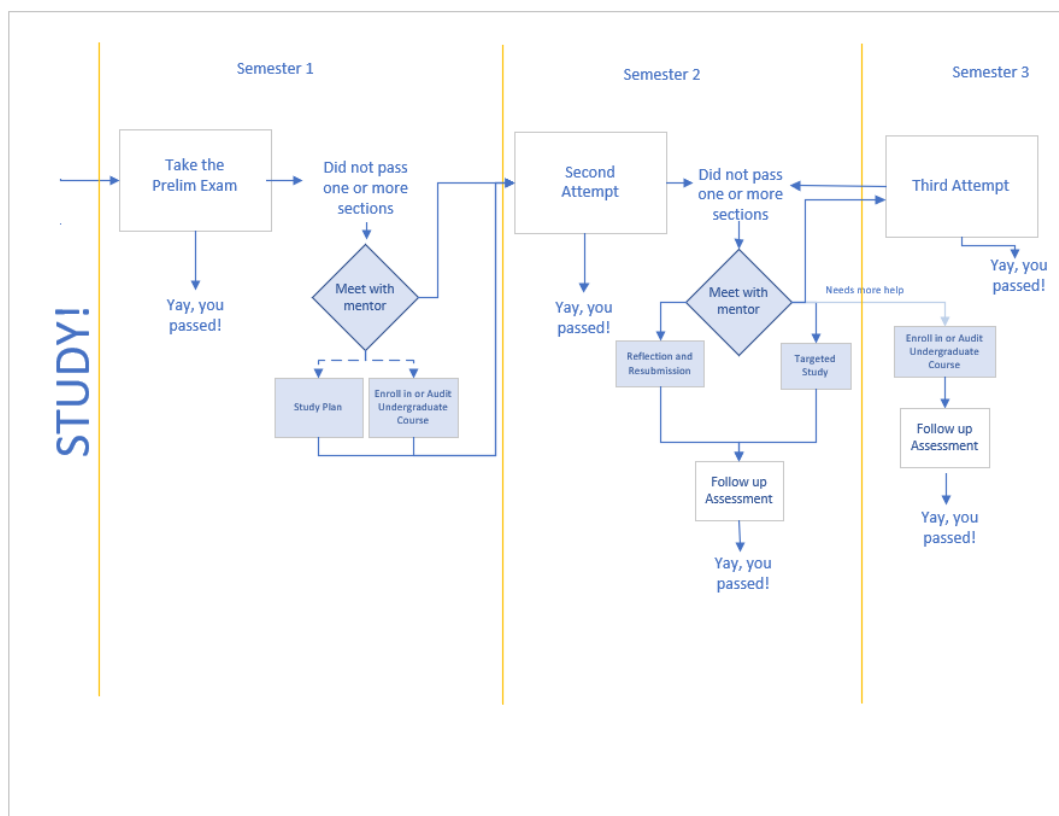
The preparation and implementation of each section of the preliminary examination are carried out by the faculty Preliminary Exam Committee, graduate student Readers and Tutors, and department staff.

The Preliminary Examination Committee is responsible for assembling each section of the exam and creating solutions if problems are new or need improvement. Approximately two-thirds of the content is derived from a published problem bank maintained by the department's Academic Coordinator or designated staff. The Preliminary Examination Committee chair assigns members of the committee to assemble exams for specific subjects and create new problems for each section as appropriate. The committee also approves grading rubrics developed by graduate student Prelim Readers, reviews their grading, and sets passing thresholds for the exams. For students who do not meet the passing threshold, the committee collaboratively reviews and discusses these individual exams to ensure fair and comprehensive evaluations. To maintain confidentiality, Prelim Readers will have restricted access to exam takers' identities beyond student ID numbers and cannot also be appointed as Prelim Tutors to run the review sessions. They may, however, be asked to proctor DSP students taking the exam in another room.

## Next Steps if Exam Requirement is not Met

For each section of the exam, if a student has not passed that section after a second attempt, the Preliminary Examination Committee, in consultation with the student’s faculty mentor and the department’s academic coordinator, will review the student’s academic record and performance on the exam and, with approval from the Head Graduate Advisor, may prescribe one of the following approaches for students to prepare and pass the preliminary examination requirement for that section:

- Retake the written exam in the subsequent semester for the remaining sections not-yet-passed.
- A “Reflection and Resubmission” approach to meet the exam requirement for their remaining sections not-yet-passed (see below)
- A “Targeted Study” approach to meet the exam requirement for their remaining sections not-yet-passed (see below).
- Register in or possibly audit an undergraduate course as a way to address significant deficiencies and in preparation for retaking the written exams for their remaining subject areas not-yet-passed.



*The above visual representation of the prelim process represents the path the vast majority of our students will take. Each student’s completion path will be unique and any path that strays from the visual above will be addressed on a case by case basis.*

***The Reflection and Resubmission Approach*** is appropriate for a student whose exam grade in a given subject area/section was near the passing threshold. The approach can be initiated at the conclusion of the student's second attempt to pass the exam. The Preliminary Examination Committee would ask the student to review their exam and correct their solutions. The committee member responsible for the section (the exam writer) will meet with the student to discuss the resubmitted work to be confident the student understands the concepts, and to provide any further guidance needed. The student will then be asked to complete a follow up assessment in the form of a short *targeted exam*, which consists of one or two new problems, focusing on the skills discussed with the exam writer. These problems should be distinct from the problems the student was given during the failed written exam but they can be similar. The targeted exam should be administered within two to four weeks of the meeting with the graduate mentor but no later than the last day of classes for the semester. The targeted exam will be administered under exam conditions. The targeted exam will be proctored and graded by the exam writer.

***The Targeted Study Approach*** is appropriate for students whose exam results show weaknesses in one sub-field (e.g., Optics). The student will be asked to focus on that sub-field and will be given a set of practice problems chosen by the exam writer to complete. These problems should be accessible from the published prelim problem bank. The student will be asked to complete these problems and then meet with the exam writer to discuss the solutions and so the exam writer can provide guidance with any needed preparation in the targeted area of focus. The student will then be asked to complete a short targeted exam focused on the topics within the targeted area of focus. The format of the targeted exam is the same as the one described for the "Reflection and Resubmission" approach.

In rare instances, if a student demonstrates a significant lack of understanding in one or more sections of the exam, despite potentially having previously taken the course at their undergraduate institution, the Preliminary Examination Committee and the student's faculty mentor may recommend the student enroll in or audit any of the associated UC Berkeley undergraduate courses before retaking those sections of the exam. The relevant courses are Physics 105 for Classical Mechanics, 110B for Electromagnetism, Optics, and Relativity, 112 for Statistical Mechanics and Thermodynamics, and 137B for Quantum Mechanics. It is recommended that twice during that semester, the student should meet with their mentor to discuss study progress. Full or partial completion of the associated undergraduate course in the Berkeley physics department would then be followed by a short follow-up assessment (one or two new problems) under exam conditions, focusing on targeted areas rather than requiring the student to wait until the subsequent semester to retake that section of the exam. The format of this follow-up assessment is the same as the one described for the "Reflection and Resubmission" approach. Additionally, serving as a teaching assistant (GSI) for a course deemed appropriate to reinforce previous undergraduate coursework could be considered beneficial for the student's preparation.

Any of the alternative approaches discussed in this section must be approved by the Preliminary Examination Committee chair and Head Graduate Advisor.

## Tracking Progress Towards Meeting the Preliminary Examination Requirements

A Berkeley Physics graduate student is expected to make good academic progress by meeting all preliminary examination requirements within their first three semesters of graduate study. The Physics department tracks a student's progress and conveys their recommendations to the graduate student in writing.

- At the conclusion of each primary exam period, students will be able to access their graded work for each section they have taken to view their exam score and will be informed of the threshold score for passing each section.
- At the conclusion of Fall Semester exams, ALL students are invited to log into a portal to view their exam score.
  - New students that have passed all sections of the exam receive an email blast (with emails listed in the bcc,) informing them that they have successfully completed the preliminary examination requirement.
  - New students that have one or more sections still to pass receive an email blast (with emails listed in the bcc), with a link to the policy and a reminder for them to meet with their grad mentor.
  - Ongoing students would receive a templated letter of warning should they still not have passed an individual section of the exam, unless they qualify for the Reflection and Resubmission approach, or a Targeted Study approach, which should be followed within that semester. An unsuccessful result of that approach would result in a letter of warning.
- At the conclusion of Spring Semester exams, ALL students are invited to log into a portal to view their exam results.
  - New students that have not taken ANY sections of the exam yet, and have had no contact with their grad mentor or Head Grad Advisor, should receive a letter of warning.
  - New students that have not passed all four sections of the exam would receive an email blast (with emails listed in the bcc), with a link to the policy and a reminder for them to meet with their grad mentor.
  - Ongoing students would receive a letter of warning should they still not have passed an individual section of the exam, unless they qualify for the Reflection and Resubmission, or Targeted Study approach, which should be followed within



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that semester. An unsuccessful result of that approach would result in a letter of warning.

All letters and communications should include a link to this policy and strategies to help students prepare for successful exam completion. These strategies might include suggesting specific areas of study for exam preparation or recommending that the student meet with their graduate mentor to discuss alternative preparation methods, such as enrolling in or auditing the associated undergraduate course.

A letter of warning indicates performance that is less than fully satisfactory and falls short of the minimum standards expected by the Department. The Ph.D Progress Committee, consisting of the student's mentor, or their Ph.D. advisor if one is already declared, the Vice Chair for Academics, and the Head Graduate Advisor, is responsible for reviewing the academic record of students deemed to be not in good academic standing. In discussions about performance on the preliminary examination, the chair of the current Preliminary Examination Committee (at the time of the student's fourth semester) will join this group. This committee is responsible for determining when a student has returned to good academic standing or whether Academic Probation needs to be considered.

## Implementation of this Policy

This policy is in effect as of August 21, 2024 and applies to all students entering the physics graduate program for the Fall 2024 semester and after.

Students who entered the physics graduate program in or prior to Spring 2024 but have not yet fully satisfied the Preliminary Examination requirement after their second semester will be reviewed by the PhD Review Committee. These students will have access to the new approaches and resources outlined in this policy and will have two semesters (Fall 2024 and Spring 2025) to complete the Preliminary Examination requirement, before a Letter of Warning will be issued.