

# GRADUATE STUDENT GUIDE

Physics  
@BERKELEY

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# A. Introduction

*A note from Department Chair and Associate Professor James Analytis:*

Congratulations on joining the Department of Physics at UC Berkeley! While we have always had an important role in the story of modern physics, you are now part of our future. We have put together this guide to help you and your advisor understand what to expect, what milestones you might aim to meet and when to meet them. In choosing your research, ask yourself not only what you want to work on, but who you want to work with. Physics is an intrinsically social pursuit, and creativity thrives when we work together. Please also review [our community principles](#), which form the basis of how our community interacts and communicates. We can't wait to make new discoveries with you as you embark on this exciting journey in Physics!

- James

## A.1 About this Guide

Your advising team created this Berkeley Physics Graduate Student Guide with the intention of compiling all policies and procedures relevant to graduate students in a single location. Our goal is not only that this document will help orient you to the Physics Ph.D. program when you first join us, but also that you will use it proactively throughout your graduate career to set yourself up for success. This guide is an example of our community principle that *we strive for transparency*.

This guide will be updated and republished, at a minimum, every summer; old versions will be archived and available to access digitally. As necessary, we may make updates to this guide during the academic year. In those cases, we will make an explicit note of the changes and publish them [here](#).

## A.2 About the Department

### A.2.1 Physics Department Community Principles

Our [Physics Department Community Principles](#) are a series of aspirational statements reflecting the type of culture and work/study environment we wish to build and sustain. They describe the cultural norms to which we wish to subscribe, and describe the behaviors that contribute to Berkeley Physics remaining a respectful and welcoming space. You can [read more about our principles in this handbook](#), which was compiled by a subgroup of the Physics Staff for Action on Racial Justice (P-SARJ). You are invited to browse it or to refer to it as needed when you encounter challenges in implementing the Physics Department Community Principles.

## A.2.2 Department Leadership, Key Operational Staff, and Your Advising Team

The Physics Department at Berkeley is part of the [Mathematical & Physical Sciences \(MPS\) Division](#) of the College of Letters and Science (L&S). While our undergraduate major is governed by L&S policies, our graduate program is governed by policies of the [UC Berkeley Graduate Division](#). The Graduate Division assigns one of their academic advisors to each department on campus; this advisor works most closely with your departmental GSAOs (see “Your Departmental Advising Team” below) behind the scenes, but you may hear from them once or twice during your time at Berkeley.

### Department Leadership

James Analytis - Associate Professor and Department Chair

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Roia Ferrazares - Director of Administration

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### Key Operational Staff

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### **Your Departmental Advising Team**

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Joelle Miles - Assistant Director of Student Services & Lead Graduate Advisor (GSAO)

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378 Physics North

Christian Natividad - Graduate Advisor (GSAO)

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You can see the most current staff organization chart [here](#).

## **A.3 Key Resources for Getting Started as a Graduate Student at Berkeley Physics**

Following is a list of resources that we recommend you review before you start your first year in our program, and keep handy for future reference.

- The Berkeley Graduate Division’s [Guide to Graduate Student Policy](#)

The policies in this guide govern your graduate student expectations and opportunities here at Berkeley. Our advising team will spend more time with most of the policies in this guide than the average student; however, you as the student are ultimately responsible for adhering to and understanding the policies in this guide.

- At-a-Glance Guide to the Berkeley Physics Ph.D. Degree Requirements and Milestones - see the last two pages of this guide, and download the document directly [here](#)
- Checklist for your first and second years in the program - [see Appendix](#)
- Instructions for obtaining California residency for tuition purposes - [see Appendix](#)
- Berkeley Physics Graduate Student Pay Plan - [see Appendix](#)
- Applying for academic accommodations via the Disabled Students Program (DSP) - [see Appendix](#)
- Requesting access to the Physics buildings, research spaces, and assigned offices - [see Appendix](#)

## B. Ph.D. Degree Requirements

This section describes the Physics Department's expectations for the progress of a graduate student from admission to award of a Ph.D. Because students enter the program with different training and backgrounds and because dissertation research by its very nature is unpredictable, the time-frame for individual students will vary.

Nevertheless, failure to meet the goals set forth here without appropriate justification may indicate that the student is not making adequate progress towards the Ph.D., and will therefore prompt consideration by the Department and possibly by the Graduate Division of the student's progress, which could lead to probation and later dismissal.

Please reach out (early and often!) to your faculty mentor, Head Graduate Advisor, or GSAOs if you would like to discuss your individual progress on the degree requirements or milestones.

### B.1 Coursework

Key facts at a glance

- Minimum of 38 units of required and elective coursework.
- 19 units of required courses: 209, 211, 221A and 221B.
  - The Head Graduate Advisor may waive required courses for students who have already taken an equivalent graduate-level course **AND** passed the relevant preliminary exam.
  - Students may waive 221B if they have met the 221A requirement (either by taking the course or waiving the requirement) **AND** who (i) had a strong performance in other advanced courses in quantum physics, such as QFT or graduate CM courses, and (ii) a strong performance (B+ or better) in the 137AB equivalent.

- 19 units of elective courses; at least 11 units must be 200-series courses.
  - They can include classes in other science and engineering departments.
  - Physics 290, 295, 299, 301, and 602, along with upper-division undergraduate courses that are required for the Physics BA, are excluded from the 19 elective units.
- Ask the department's GSAOs if you are transferring from another graduate program to possibly receive elective credit.
- Passing individual courses requires a grade of B- or better; required courses that have been failed must be repeated.
- In addition, students must maintain an overall GPA of 3.0.
- No more than  $\frac{1}{3}$  of total elective units may be graded S/U

Graduate students are required to take a minimum of 38 units of approved upper division or graduate elective courses (excluding any upper division courses required for the undergraduate major). The department requires that students take the following courses which total 19 units: Physics 209 (Classical Electromagnetism), Physics 211 (Equilibrium Statistical Physics) and Physics 221A-221B (Quantum Mechanics). Thus, the normative program includes an additional 19 units (five semester courses) of approved upper division or graduate elective courses. At least 11 units must be in the 200 series courses. Some of the 19 elective units could include courses in mathematics, biophysics, astrophysics, or from other science and engineering departments. Physics 290, 295, 299, 301, and 602 are excluded from the 19 elective units. Physics 209, 211 and 221A-221B must be completed for a letter grade (with a minimum average grade of B). No more than one-third of the 19 elective units may be fulfilled by courses graded Satisfactory, and then only with the approval of the Department. Entering students are required to enroll in Physics 209 and 221A in the fall semester of their first year and Physics 211 and 221B in the spring semester of their first year. Exceptions to this requirement are made for 1) students who do not have sufficient background to enroll in these courses and have a written recommendation from their faculty mentor and approval from the head graduate advisor to delay enrollment to take preparatory classes, 2) students who have taken the equivalent of these courses elsewhere and receive written approval from the Department to be exempted.

If a student has taken courses equivalent to Physics 209, 211 or 221A-221B, then subject credit may be granted for each of these course requirements. A faculty committee will review your course syllabi and transcript. Waivers must be requested in a student's first year, and the waiver request form is shared directly with incoming students the summer prior to their first semester. If the committee agrees that the student has satisfied the course requirement at another institution, the student must secure the Head Graduate advisor's approval. The student must also take and pass the associated section of the preliminary exam. Please note that official course waiver

approval will not be granted until after the preliminary exam results have been announced. If course waivers are approved, units for the waived required courses do not have to be replaced for Ph.D. course requirements. If a student has satisfied all first year required graduate courses elsewhere, they are only required to take an additional 19 units to satisfy remaining Ph.D. course requirements. (Note that units for required courses must be replaced for the MA degree course requirements even if the courses themselves are waived; for more information please see [MA degree requirements](#)).

In exceptional cases, students transferring from other graduate programs may request a partial waiver of the 19 elective unit requirement. Such requests must be made at the time of application for admission to the Department.

Students who have fellowships and will not be teaching, or who have covered some of the material in the first year courses material as undergraduates may choose to take an additional course in one or both semesters of their first year.

Many students complete their course requirements by the end of the second year. In general, students are expected to complete their course requirements by the end of the third year. An exception to this expectation is that students who elect (with the approval of their mentor and the head graduate advisor) to fill gaps in their undergraduate background during their first year at Berkeley often need one or two additional semesters to complete their course work.

## B.2 Preliminary Exams

The preliminary examination is designed to ensure that students command a broad spectrum of undergraduate physics prior to their engaging in 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 exam will have passed the preliminary examination. The Department expects students to pass the examination within the first three semesters of graduate study (see further notes on this below).

The preliminary exam is intended as one tool for helping the Department evaluate that students are 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. Consequently, a student would not be asked to leave the Department based solely on performance on the written preliminary exam.

The written 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 in the quantum mechanics section.)

While passing all sections of the preliminary exam is the most common way to satisfy the requirement, an alternative route is to take an undergraduate course on the subject and pass it with a qualifying grade of B. This option is open to all students at any time, and attempting to do so does not preclude the student from taking the exam again, so long as the requirement is met within the prescribed time frame (i.e., the course must have been passed and the grade of B achieved within the first four semesters for most students). While such courses can help satisfy the requirement, they do not count towards the 19 elective units. Your faculty mentor can help you decide which option is best for you.

A student who passes any section of the written exam need not take that section again. Each section lasts three hours and covers traditional, textbook style problems, as well as more comprehensive questions that specifically test physical and numerical insight (e.g. order-of-magnitude estimates including physical constants, analyzing physical situations by application of general principles instead of complex calculations, etc.).

Students are encouraged, but not required, to attempt the examination during their first semester. Students are required to have attempted all of the written sections in their second semester. The Head Graduate Advisor must approve exceptions to this schedule; all exceptions, except those due to illness or emergency, must be approved in advance.

The academic record of a student in their third semester who has not passed all four written sections will be reviewed. Near the beginning of the third semester (as prelim exam results become available) a faculty committee, in consultation with the student's faculty mentor, will review the student's academic record and performance on the prelims to determine whether a sufficient breadth of undergraduate physics has been demonstrated. This review may include meeting with the student to ask questions to further assess the student's understanding of undergraduate physics, focusing primarily although not exclusively on the not-yet-passed sections of the exam, to discuss the student's background and how best to address remaining deficiencies. If their determination is that the student has a sufficient breadth of undergraduate physics, the student will be determined to have passed the prelim exam, and will be allowed to proceed with research. If the committee's determination is that this understanding is not yet demonstrated, they will recommend that the student be sent a warning letter by the

Department Chair, and will specify requirements (including a timeline) for the student to return to making sufficient academic progress. These requirements could include taking and passing with a B or better grade specific undergraduate courses during the third and/or fourth semester, and/or retaking and passing sections of the prelim exam not yet passed at the start of the fourth semester. This review could also result in additional recommendations to the student, such as serving as GSI for a course deemed appropriate to reinforce previous undergraduate coursework.

A faculty committee will then review the student's efforts towards returning to good academic progress at the beginning of the fourth semester. This 4th semester review may also include meeting with the student to ask questions to assess the student's understanding of undergraduate physics. This faculty committee will review the student's entire academic record – including performance on the preliminary exam, coursework, and intended research plans – and recommend to the Department Chair whether the student is making sufficient academic progress and may be allowed to proceed with research. The Head Graduate Adviser or Department Chair will report the results to the Graduate Division. If requirements established in the 3rd semester review include undergraduate courses taken in the fourth semester, this 4th semester review can be deferred until the grades in these courses are determined, but in no case can this review be extended past the end of the student's 4th semester. This review is not intended to create additional requirements, but to determine if previous requirements have been met, and in particular should not require any further attempts at passing any section of the preliminary exam. The intent of this fourth semester review by the faculty committee is to determine whether a student has mastered sufficient undergraduate physics to start Ph.D. level research by the end of the 2nd year. If the committee concludes that such mastery is not present, they will recommend to the Department Chair that the student be asked to leave the program due to inadequate progress towards the Ph.D.

A revision in this schedule can be granted, for one or more sections of the preliminary exam, for any student with an incomplete undergraduate physics education as determined by consultation between the student and the student's faculty mentor. The Head Graduate Advisor must approve this revised schedule. Any student exercising this option is expected to take one or more undergraduate physics courses at UC Berkeley during the first one or two semesters. This student should follow the regular schedule outlined above for any sections of the exam not affected by the revised schedule, and is allowed to attempt the delayed section(s) at the start of their first one or two semesters for practice, in which case the student would not be required to repeat any sections that have been passed during this period. The student would then be expected to take all sections of the exam not yet passed at the beginning of the 3rd semester, and to repeat any unpassed sections at the start of the 4th semester. A faculty committee will be

asked to assess this student following this exam if there are still sections not passed, following guidelines above, and can either 1) determine that the student has demonstrated a sufficient breadth of undergraduate physics, and hence has passed the prelim exam, or 2) recommend that the student be sent a warning letter with specific requirements and a timeline for being returned to making sufficient academic progress; the most likely requirement and timeline for this is to be asked to study over the following summer and to attempt the still unpassed sections a final time at the start of the 5th semester. The intent of this 4th and potentially 5th semester review by the faculty committee is that a student shall either be determined to have mastered sufficient undergraduate physics to start Ph.D. level research by the start of their 3rd year, or else be asked to leave the program due to inadequate progress towards the Ph.D. Delays in this decision beyond the start of the 3rd year are highly discouraged and will only be considered under exceptional circumstances.

## B.3 Start of Research

A handful of students enter our graduate program with an existing relationship with a research advisor, and jump straight into research; but most students spend the first few semesters of the program getting to know different research areas and groups prior to declaring an advisor. You may choose to do research rotations with any number of groups, and rotations can consist of anything from attending group meetings to taking on a full project – it's up to you and your rotation supervisor to decide. We encourage students to do at least one to two rotations, but they are optional.

Each semester we send out a survey to research supervisors and ask them to tell us if they are looking for new graduate students in the coming year. [See the current list here.](#)

As you are exploring options for research groups and possible dissertation topics, we strongly encourage you to discuss the employment options that your potential advisor will be able to provide you. For example, you should ask them if they can provide you with paid research year-round, or if you will be expected to serve as a GSI for part or most of the year.

### B.3.1 Faculty Mentors

Incoming graduate students are each assigned a faculty mentor. When possible, mentors and students are matched according to the student's research interest. If students' research interests change, or if they feel there is another faculty member who can better serve as a mentor, they are free to request a change of assignment.

The role of the faculty mentor is to advise graduate students who have not yet identified research advisors on their academic program, on their progress in that program, and on

strategies for passing the preliminary exam and finding a research advisor. Mentors are also a “friendly ear” and are ready to help students address other issues they may face coming to a new university and a new city. Mentors are expected to meet with the students they advise individually a minimum of once per semester, but often meet with them more often. Mentors should contact incoming students before the start of the semester, but students arriving in Berkeley should feel free to contact their mentors immediately.

Student-Mentor assignments continue until the student has identified a research advisor. While many students continue to ask their mentors for advice later in their graduate career, the primary role of advisor is transferred to the research advisor once a student formally begins research towards their dissertation.

### B.3.2 Advisor Declaration

Students are encouraged to begin research as soon as possible. Many students identify potential research advisors in their first year and most have identified their research advisor before the end of their second year. The Department asks that both student and research advisor sign a [form indicating that the student has joined the advisor's research group](#) with the intent of working towards a doctoral dissertation. In many cases, the student will remain in that group throughout their graduate work, but sometimes the student or faculty advisor will decide that the match of individuals or research direction is not appropriate; students are encouraged to talk to the head graduate advisor early if they anticipate such a situation. Starting research early gives students flexibility to change groups when appropriate without incurring significant delays in time to complete their degree.

Departmental expectations are that experimental research students begin work in a research group by the summer after the first year; this is not mandatory, but is strongly encouraged. Students doing theoretical research are similarly encouraged to identify a research direction, but often need to complete a year of classes in their chosen specialty before it is possible for them to begin research. Students intending to become theory students may not be able to start research until the summer after their second year. Such students are encouraged to attend theory seminars and maintain contact with faculty in their chosen area of research even before they can begin a formal research program.

Students who choose dissertation research with an advisor who is not in the department must find an appropriate Physics faculty member who agrees to serve as the departmental research supervisor of record and as co-advisor. This faculty member is expected to monitor the student's progress towards the degree and serve on the student's qualifying and dissertation committees. The student will enroll in Physics 299

(research) in the co-advisor's section. The student must file the [Outside Research Proposal](#) for approval.

Students who have not found a research advisor by the end of the second year will be asked to meet with their faculty mentor and the Head Graduate Advisor to develop a plan for identifying an advisor and research group. Students who have not found a research advisor by Spring of the third year are not making adequate progress towards the Ph.D. Based on their academic record and the documentation they provide, such students may be warned by the department that they are not making adequate progress, and will be formally asked to find an advisor. The record of any student who has not identified an advisor by the end of Spring of the fourth year will be evaluated by a faculty committee and the student may be asked to leave the program.

## B.4 Qualifying Examination

Within 2-3 semesters of beginning research, the Department expects students to take the Qualifying Examination covering their research field and related areas. This exam is required for advancement to Ph.D. candidacy, and signifies that the student is prepared and qualified to undertake research, not that the student has already completed a significant body of work towards the Ph.D. It is therefore expected to occur for most students in the 3rd year, and no later than the 4th year. A student is considered to have begun research when they first register for Physics 299 or fill out the department advising form showing that a research advisor has accepted the student for Ph.D. work, at which time the research advisor becomes responsible for guidance and mentoring of the student. The examination is administered by a four-member committee (consisting of three Physics Department and one outside faculty member, including the research advisor) approved by the Graduate Division on behalf of the Graduate Council, and may be repeated once at the recommendation of the examining committee. The Department expects that all committees include at least one theorist and one experimentalist. For students with advisors from outside the department or who are not members of the Academic Senate (e.g., with appointments at LBNL or SSL), permission for a five-member committee may be requested from Grad Division to allow both the non-faculty and faculty advisor to be on the committee; in this case, approval of the proposed research by the Head Graduate Advisor and the Chair of the Department must also be obtained before the student takes their qualifying exam.

Rules and requirements associated with the Qualifying Exam are set by the Graduate Division on behalf of the Graduate Council. The committee membership and the conduct of the exam are therefore subject to Graduate Division approval. The exam is oral and lasts 2-3 hours. The Graduate Division specifies that the purpose of the Qualifying Exam is “to ascertain the breadth of the student's comprehension of

fundamental facts and principles that apply to at least three subjects areas related to the major field of study and whether the student has the ability to think incisively and critically about the theoretical and the practical aspects of these areas.” The Grad Division also states that this oral qualifying exam serves a significant additional function. “Not only teaching, but the formal interaction with one’s students and colleagues at colloquia, annual meetings of professional societies and the like, often require the ability to synthesize rapidly, organize clearly, and argue cogently in an oral setting.... It is consequently necessary for the University to ensure that a proper examination is given incorporating [these skills].”

The Qualifying Exam requires that the student, in consultation with their advisor, identify three topics which in the Physics Department are expected to be a proposed Dissertation Topic, an Area of Research, and a General Area of Research. The General Area of Research is taken to be the sub-field within physics (e.g. astrophysics, biophysics, particle physics, condensed matter physics); the Area of Research to be a still broad but more narrowly defined field within the sub-field (e.g. magnetism, or QCD). For fields where these choices are not obvious, the student should suggest appropriately broad topics contiguous to their Dissertation Topic. The choice of topics is subject to the approval of the Physics Department Head Graduate Adviser, per Graduate Council Requirements. Qualifying Exams in the Physics Department begin with a presentation from the student that is expected to last approximately, but no more than, 45 minutes, during and after which questions related to the presentation are typically asked. The presentation should focus on the student's research goals and necessary background material, including the proposed Dissertation Topic and the Area of Research that encompasses the dissertation topic, as well as a proposed schedule for finishing the Ph.D. and goals/milestones in that schedule. After this presentation, following a short break if desired, members of the committee will further question the student both about the presentation itself and about the broader subject areas included in the General Area of Research, testing the student’s “ability to think incisively and critically about the theoretical and the practical aspects of these areas”. The Department expects these questions to be related to the student's research field, but to be broad in nature rather than narrowly related to the dissertation itself. Ability to give a coherent and organized presentation and to answer questions on the three topics in an oral setting is also required for passing this exam. Note that adjustments may be made on the basis of campus policies for cases in which an otherwise able individual is prevented from meeting an oral requirement by a physical disability.

Please review the [Qualifying Exam: Best Practices appendix](#) for additional information about what to expect during your exam.

### B.4.1 Short Proposal for the Qualifying Exam

One week before the exam, students should submit a short summary of their research plans for the upcoming year to the exam committee. This gives the student an opportunity to articulate in scientific language their proposed research and gives them their first experience to make a case similar to what they would be doing as professional researchers.

The summary should be short (~400 words - about one page - but certainly not more than 800) and written for a target audience of people who are knowledgeable about the subfield (e.g., atomic physics, particle physics, ...) but not an expert in the area of the student's research. It should be submitted to the research advisor, who may then give feedback and share the (possibly revised) summary with the rest of the exam committee. The student may be asked questions about the summary during either part of the qualifying examination.

Passing the exam and advancing to candidacy is contingent on submission of this summary and having it signed by the dissertation advisor.

## B.5 Advancement to Candidacy

After passing the Qualifying Examination, the next step in the student's career is to advance to candidacy as soon as possible. Advancement to candidacy is the academic stage when a student has completed all requirements except completion of the dissertation. Students are still required to enroll in 12 units per semester; these in general are expected to be seminars and research units.

### B.5.1 Reduction in Nonresident Tuition - for International Students

The following is quoted from the [Graduate Guide to Policy](#), and typically only applies to international students:

*The nonresident supplemental tuition (NRST) for nonresident graduate students who have been advanced to candidacy for the doctorate is reduced to zero for a maximum calendar period of three years calculated from the semester subsequent to the students' advancement, whether registered or not. Any student who continues to be enrolled or who re-enrolls after the three-year period will be charged the full nonresident tuition rate that is in effect at the time.*

## B.6 Completion of Dissertation Work

The expected time for completion of the Ph.D. program is six years. While the Department recognizes that research time scales can be unpredictable, it strongly

encourages students and advisors to develop dissertation proposals consistent with these expectations. The Berkeley Physics Department does not have dissertation defense exams, but encourages students and their advisors to ensure that students learn the important skill of effective research presentations, including a presentation of their dissertation work to their peers and interested faculty and researchers.

The dissertation is the most important requirement for the doctoral program. The degree is never granted for completion of course work only, no matter how extensive. It is awarded in recognition of a student's knowledge of a broad field of learning and for distinguished accomplishment in that field through an original contribution of significant knowledge and ideas. The student's research must reveal high critical ability and powers of imagination and synthesis. The dissertation, the product of independent investigation under faculty supervision, must be submitted to the committee in charge and must receive both its approval and the approval of the Graduate Council.

Unless a student has made special arrangements with the committee, a complete draft of the dissertation must be submitted to each member of the dissertation committee at least six weeks before the planned graduation. This is to give the committee sufficient time to read the dissertation and suggest changes.

## B.7 Other Ph.D. Milestones

The following milestones are *recommended* for all students; those marked with an asterisk are **required** for all students who entered in the **Fall 2021 semester and beyond**.

### B.7.1 Annual Progress Reports

The Graduate Division requires that each student's performance be annually assessed to provide students with timely information about the faculty's evaluation of their progress towards Ph.D. Annual Progress Reports are completed during the Spring Semester. In these reports, the student is asked to discuss what progress he or she has made toward the degree in the preceding year, and to discuss plans for the following year and for Ph.D. requirements that remain to be completed. The mentor or research advisor or members of the Dissertation Committee (depending on the student's stage of progress through the Ph.D. program) comment on the student's progress and objectives. In turn, the student has an opportunity to make final comments.

Before passing the Qualifying Exam, the annual progress report is completed by the student and either their faculty mentor or their research advisor, depending on whether or not the student has yet begun research. This form includes a statement of intended

timelines to take the Qualifying Exam, which is expected to be within 2-3 semesters of starting research.

After passing the Qualifying Exam, the student and research advisor complete a similar form, but in addition to the research advisor, the student must also meet with at least one other and preferably both other members of their Dissertation Committee (this must include their co-advisor if the research advisor is not a member of the Physics Department) to discuss progress made in the past year, plans for the upcoming year, and overall progress towards the Ph.D. This can be done either individually as one-on-one meetings of the graduate student with members of the Dissertation Committee, or as a group meeting with presentation. The Graduate Council requires that all doctoral students who have been advanced to candidacy meet annually with at least two members of the Dissertation Committee. The annual review is part of the Graduate Council's efforts to improve the doctoral completion rate and to shorten the time it takes students to obtain a doctorate.

### **B.7.2 Poster Presentation\***

Each student should prepare a poster of their research and present it at a departmental poster session on campus. The primary audience is current undergraduate students or prospective graduate students. This not only provides the student an opportunity to communicate their science to young scientists, but it creates an event for the grad-student cohort to come together and celebrate their progress. This presentation should happen about mid-way between starting research and graduation, at a time determined jointly by the student and the research advisor.

### **B.7.3 Identification of the Final Year\***

At the time of the above poster presentation and with the support and guidance of the dissertation committee, each student should estimate where they are on their journey and make a non-binding declaration of a target semester for graduation. This target should be submitted to the GSAO.

Once the student has identified their target semester for filing the dissertation, they should update their Expected Graduation Term (EGT) in CalCentral. Students are responsible for keeping their EGT updated, and the system will accept changes as often as necessary. To update your EGT, go to CalCentral > Submit a Form > Change of Expected Graduation Term Request.

### **B.7.4 Submission of the Dissertation Table of Contents\***

In the final year before graduation, in order to make sure that students receive early feedback on the content and structure of the planned dissertation, each student should

lay out the big picture of their body of research and work with their committee to ensure they are on track to complete a satisfactory dissertation. A table of contents should be submitted to the advisor about six months ahead of the planned submission date for the dissertation.

### B.7.5 Subgroup Talk\*

In the final year—six months or more prior to graduation—each student should give a talk on their research achievements. It should address colleagues in the student's field of expertise. The presentation should not only mirror a presentation in a professional setting, but also be an occasion to celebrate one's achievements in front of colleagues, friends, and family.

## C. MA Degree

The majority of students who complete the Physics Ph.D. also qualify for the Master of Arts (MA) in Physics degree along the way. However, the master's degree is not given automatically; instead, interested students must request an academic review and meet all qualifications in order to be conferred the degree. Physics MAs are only conferred in the spring and fall semester (no summer degrees), and students must be enrolled in the semester for which they request the degree.

### C.1 Degree Requirements

Students in the physics doctoral program may apply for the MA degree after completing all requirements listed below. The Department will not consider admissions applications from students who intend to work toward the MA degree only. Ph.D. candidates are not required to file for the MA.

The Master's degree is administered according to the regulations approved by the Academic Senate. The Physics MA requires a comprehensive examination rather than a thesis; passing the written preliminary exam is considered the comprehensive exam.

The Physics MA candidate must complete the following:

1. Two semesters of academic residence. Academic residence is defined as payment of registration fees and enrollment in at least 4 units in the 200 series courses each semester of academic residence;
2. Physics 209, 211, and 221A-221B or 19 replacement units of approved graduate coursework, if subject waivers have been granted for prior coursework;

3. 16 additional elective units of approved upper division and graduate courses;
4. pass a comprehensive examination (passing the preliminary exams constitutes passing the comprehensive exam).

Notes:

- Total units required for the MA degree is 35 semester units of upper division and graduate work in physics (or related fields) with an average grade of at least B.
- Twenty four of the 35 units must be from 200 level courses completed at Berkeley as a graduate student.
- Eighteen of the 35 units must represent graduate courses in physics.
- Neither upper division courses required in the Physics Major Program nor Physics 290, 295, 299, 301, 375 or 602 may be used to satisfy the 35 unit requirement.
- No more than one-third of the 16 elective units may be fulfilled by courses graded Satisfactory.

## C.2 Applying for the MA

The Physics GSAOs will send out instructions and a deadline each fall and spring semester for students who wish to apply for the MA in that term. Students are asked to confirm they have met each of the MA degree requirements before the GSAOs do the final check and communicate degree completion to the Graduate Division. Degrees are typically conferred within a month of the end of the semester, and diplomas are usually mailed within three months.

The first step in the MA degree conferral process is adding the Physics MA plan to your academic programs in CalCentral. You can do this anytime, and ahead of the semester you intend to petition for the MA. For instructions, please review our [annotated guide to adding the Physics MA plan](#).

Once you have added the MA plan to your academic programs, you will be able to track your progress to the degree via your [Academic Progress Report \(APR\)](#) in CalCentral. Contact your GSAOs if you have any questions about the progress detailed in your APR.

## D. Graduate Funding and Finances

The Physics PhD program is a fully funded program, based on a standard six-year trajectory. Funding includes salary (paid employment), stipends, and full payment of tuition, mandatory campus fees, and student health insurance. The six-year funding commitment is contingent upon satisfactory academic progress in the Ph.D. program, as defined by the department, and satisfactory performance in all teaching assignments.

Salary comes from Academic Student Employment (ASE) or research positions. Per semester, Physics grads will typically hold either a Graduate Student Instructor (GSI) appointment or a Graduate Student Researcher (GSR) appointment. Appointments which are made at the 25%-50% time (10-20 hours per week) will pay your University Registration Fee, Educational Fee and Health Insurance Fee). GSI and GSR appointments are almost always set at or near 50% FTE. \*FTE stands for full-time equivalent wherein the standard full work week is 40 hours.

ASE appointments are supplemented with stipends and awards to boost student funding according to the annual pay plan. The Physics Grad Student Pay Plan describes the funding amount (via salary, stipend, and other sources) that students should expect to receive on a yearly basis, based on status and progress within the PhD program. View the [current Grad Pay Plan here](#).

*Some students may receive funding through fellowships. The funding plan takes this into account and often removes the necessity for fellowship recipients to work as GSIs or GSRs for salaried work as long as their fellowship is active.*

### D.1 Graduate Student Instructor Appointments

The term Graduate Student Instructor (GSI) at Berkeley is similar to Teaching Assistant (TA) at other universities. GSI responsibilities include, but are not limited to leading discussion sections or labs and instructing prescribed course content. GSIs may not be solely responsible for instructional content of the course, selection of assignments, planning of exams, or final determination of course grades, although the GSI may assist in the above tasks in collaboration with the instructor of record who has final authority. GSIs cannot be compelled to deliver a lecture.

Appointments are semester-long, and reappointment is not automatic. GSIs appointed at 50% can be expected to work 16–20 hours per week during instructional and examination periods, including time spent in preparation, classroom and laboratory teaching, office consultation, and reading student papers. ASEs are obligated to inform their supervisor when they first perceive that their assignments might exceed the

assigned workload maximum for their appointments. At no time should an ASE continue to work beyond eight hours in a day, or forty hours in a week.

GSI employment is a common component of graduate funding plans. A vast majority of Physics graduate students will be GSIs at some point during their time at Berkeley.

### D.1.1 GSI Hiring Process

Students will receive an email announcing the start of each staffing season (see following paragraphs) and instructions on how to begin the hiring process. For more information on the GSI hiring process, please see our guide to [GSI hiring policy](#).

Fall GSI recruitment begins in April of every year. Applications for fall appointments are due mid-May. GSI appointments for incoming Physics graduate students will be made after submission of their intent to register (i.e. acceptance of admissions offer) at Berkeley.

Spring GSI recruitment begins in September of the preceding year. Applications for spring appointments are due mid-October.

Summer GSI recruitment begins in March of every year. Applications for summer appointments are due in mid-April.

*All Physics graduate students must apply to be considered for a GSI appointment. If students do not apply and fail to take steps to be hired as a GSI, they will forgo a major portion of their funding plan.*

### D.1.2 GSI Appointment and Fellowships

Recipients of full fellowships (e.g. NSF GRFP, Chancellor's, etc.) are subject to additional restrictions on their ability to work during the academic year. These students may hold 50% GSI appointments for one semester every academic year. The Physics Department does not hire GSIs at 25% FTE (unless they hold other appointments). This is due to the budget impact of fee remissions generated by 25% appointments.

Most fellowship recipients are permitted to work no more than an average of 25% FTE (~10 hrs/wk) across the two semesters of fellowship funding. Fellowship recipients should refer to the terms and conditions of their funding for full details on their work restrictions.

## D.2 Graduate Student Researcher Appointments

Graduate Student Researchers (GSR) are students who perform research related to the student's degree program in an academic department or research unit under the

direction of a faculty member or authorized principal investigator (PI). Graduate students may be employed during the academic year on a part-time basis, not to exceed 50% time. Appointments may go above 50% during the summer and in between the fall and spring semesters.

GSR employment is also a common component of graduate funding plans. Most Physics graduate students will be GSRs at some point during their time at Berkeley.

### D.2.1 Graduate Student Researcher Assistant (GSRA)

Sometimes a UCB graduate student will serve in a Graduate Student Researcher Assistant (GSRA) position at LBNL (Lawrence Berkeley National Lab). A GSRA is equivalent to a UCB campus GSR appointment and is eligible for the fee remission program.

### D.2.2 GSR Appointment Process

Much of the GSR appointment process requires action and initiative from students. Students must contact PIs directly to arrange GSR appointments. Once the GSR employment is negotiated, the student must submit an appointment request to the [ERSO GSR hiring site](#).

In order to avoid pay delays, ERSO needs to receive *approved* GSR appointment requests 30 days in advance of the work start date. Take action early.

If you have any questions, please contact the [ESRO Student Hiring team](#) if you have any questions.

If you are being hired as a GSR and the hiring department is **not** Physics, Math, Astronomy, EPS, or EECS: you are most likely subject to different hiring practices. Please keep an active eye out for all email messages related to GSR appointments to ensure timely hiring, onboarding, and pay.

## D.3 Essential Policies Impacting Student Academic Appointments

Unless the Physics HGA plus the Graduate Division or Campus has approved an exception to policy, the following applies to all Physics appointments:

- GSI appointments are capped at the 10th semester or 12th with exceptional approval.
- Eligible to hold academic appointments:
  - Must be in good academic standing (i.e., may not be on academic probation or have had their degree candidacy lapse) and be clear of certain disciplinary probations based on the [Code of Student Conduct](#);

- Must be UC students enrolled in at least twelve units of coursework during the semester in which they are serving.
- Students on Filing Fee status may not be appointed as GSIs.
- Students may not be appointed as GSIs during a period of *in absentia* registration status.
- Students may not be enrolled in the course for which they are appointed.
- Students may not simultaneously serve as a GSI and a Reader or a Tutor for the same course.
- During the academic year, graduate students with appointments may not exceed half time (50% FTE), nor may such appointments in combination with other University appointments exceed half time without an exception.

## D.4 Reasonable work accommodations

The University provides reasonable accommodation to otherwise qualified academic appointees who are disabled or become disabled and need assistance to perform the essential functions of their positions. An accommodation is reached after an interactive process between the University and the appointee. Please read the [Berkeley Accommodation Process for Academic Appointees with Disabilities](#) from the Academic Personnel Office's website to understand the process at UC Berkeley.

An academic appointee must furnish appropriate documentation from a health care provider regarding functional limitations or restrictions related to their ability to perform essential job functions, and then the Physics Chair must consult appropriate campus office(s) in reaching a decision to approve any reasonable accommodations.

If you decide to engage in the interactive accommodation process, please contact Roia Ferrazares at [roia@berkeley.edu](mailto:roia@berkeley.edu).

## D.5 Taxes and other Payroll Deductions

All graduate student salary payments and most of the stipend payments are fully taxable income. Only qualified fee and tuition awards are non-taxable income. Domestic students can be taxed related to federal income tax, CA state income tax, and Medicare. International students are taxed differently and should review [tax-related guidance from the Berkeley International Office](#).

## D.5.1 DCP Retirement Plan Deductions

You may be subject to mandatory deductions from campus's defined contribution (i.e. retirement) plan. You will **not** see those deductions if you are a student who meets **both** of the following requirements:

1. Are registered and enrolled in at least a half-time course load (6 units or more),
2. Are appointed and working less than 80%.

Most students are exempt from these deductions during the regular academic year (fall and spring semester) because of the above conditions. However, students lose those exemptions during the summer months and many GSR, GSI, and Reader earnings are impacted.

Please be sure to check your pay stubs or online earnings statements to see whether or not these deductions are coming out of your paychecks. **If they are, there is an important action you will need to take in the future.** Fidelity, the UC retirement benefits partner, will send you an email once we've terminated your employment on campus. The email will give you the option to choose rolling the money over into another type of retirement account or receive a check for the money you contributed. If you choose the second option, please note that you will lose about 40% of the contributions to taxes if you are not of retirement age.

You can read more information about the DCP [here](#) (UC Benefits resource) and view the [FAQs here](#) (Berkeley Central Payroll Office resource).

## E. Appendices

### E.1 First and Second-year Checklist

We recommend that you take the four required courses in the order below, but switching the order of courses can be allowed with approval from the Head Graduate Advisor. For example, our required graduate courses are built with the expectation that a student who enrolls has the same prior course experience that a Berkeley physics undergraduate major would have received; however, our first-year students join our Ph.D. program from all over the country and world, and we see students with all different physics backgrounds and undergraduate preparation levels. Students may opt to enroll in an undergraduate course to build their foundation before jumping into graduate courses. Contact your faculty mentor and/or the Head Graduate Advisor to discuss possible changes to your course schedule.

#### **First year, fall semester**

- Required: Meet your faculty mentor in August; request course waivers, if appropriate
- Typical courses: 209, 221A
- Required for all students who will serve as GSIs in the fall semester, and recommended for all students: MPS 375 (pedagogy course)
- Recommended: 251 (seminar exploring research in the department)
- Recommended: Attempt some or all preliminary exams (required for waiving a class)
- Recommended: meet research advisers, e.g. through a rotation
- Required for U.S. citizens and Permanent Residents: start establishing “intent to remain in California” for in-state tuition purposes

#### **First year, spring semester**

- Required: Meet your mentor in January
- Typical courses: 211, 221B, plus a seminar in the research area of your choice
- Required: You must have attempted all four prelims by this time
- Required for students who are US citizens and permanent residents: submit your statement of legal residence (SLR) and all documents required to request California residency

#### **First year, summer**

- Do a research project, rotation, or GSR-ship with a PI of your choice

- Submit your first-year progress report after meeting with your mentor or advisor

### **Second year, fall semester**

- Take elective courses
- If you haven't yet passed all preliminary exams, a faculty committee will review your academic record and make a recommendation about how to help you meet this milestone

### **Second year, spring semester**

- Required: Complete all four prelims by your fourth semester
- Recommended: Join a research group by the end of your fourth semester

## **E.2 CA Residency for Tuition Purposes (Domestic Students Only)**

For tuition purposes, U.S. citizens or permanent residents who are not residents of California may be able to establish California residency to be effective in one year. Students are responsible for all actions towards residency redetermination.

The department pays for your non-resident supplemental tuition (NRST - \$7551/semester) for the first year only\*. To reduce the cost of your tuition in your subsequent grad years, you should file to reclassify as a CA resident (for tuition purposes). *International students with F-1 or J-1 visas are not eligible to establish CA residency and do not need to take any action. Funding plans for international students will address NRST.*

To become a California resident for tuition purposes you must show that you have lived in California and established the intent to make California your permanent home for more than one (1) year before the first day of classes in the semester for which you seek resident status. You must begin to document your presence in the state as soon as you arrive. Be sure to:

- Obtain a driver's license or a California Identification Card (if you have never had an out-of-state driver's license) within ten (10) days of settling in California. You must have a valid California operator's license to drive a car, motorcycle or moped in the state. You can obtain a license at any of the local Department of Motor Vehicles (DMV) offices in nearby Oakland (5300 Claremont Ave.), (800)-777-0133, El Cerrito (6400 Manila Ave., (510) 235-9171. If you have a driver's license from another state you will be required to pass a written test of California vehicle laws, pass an eye exam and provide a certified copy of your birth certificate. A driving test is required if you do not have a valid license from another state or if you plan to operate a motorcycle. The DMV handbook is located at the following website: <http://www.dmv.ca.gov/pubs/pubs.htm>.

- (If applicable) Register your vehicle in the state of California within 20 days of settling in California. Vehicles are registered at the local DMV office.
- Open a local bank account (joint not recommended) as soon as possible and close all non-California bank accounts. Retain official documents showing the opening and closing of your accounts.
- Register to vote and vote in California elections. Voter registration forms are available from the Graduate Division and at voter registration tables on Sproul Plaza or any fire station, public library, or DMV office. The form is postage-paid – just fill it out and mail. You should receive verification from the County Registrar within four weeks of submitting your application. If you do not receive confirmation of your voter’s registration you should immediately contact your County’s Registrar of Voters.
  - **Important:** take steps to cancel your voter registration in other states.
- Use your California address as your permanent address. Do not list your parents or any other out-of-state address as a permanent address on any University form or other legal documents.
- Remain in California when school is not in session. Some travel allotted for purposes of research, fieldwork or a fellowship may not necessarily jeopardize your resident classification if the absence is part of a regular requirement for your degree program or fellowship.
  - Summer research: The Department will provide a summer letter attesting to your whereabouts and work during your first year as a graduate student. This letter will also cover graduate students conducting out-of-state summer research.
- Financial independence is another factor considered when determining your eligibility for classification as a California resident for tuition purposes. For fall classification, you are presumed by law to be financially independent if you are at least 24 years of age by December 31. If you will not be 24 years of age by this date, then you must show that you are not claimed as an income tax deduction by your parents or any other individual for the next tax year.
- Financial independence is not a factor in determining residence for graduate students who are employed as Graduate Student Instructors or Graduate Student Researchers for a minimum of 49% time or awarded the equivalent in University-administered funds for the term in which resident classification is sought.
- Your physical presence in California must be demonstrated during nonacademic periods. You should keep all dated material that proves your presence in the state, including airline tickets; paycheck stubs from work; credit card receipts; and bank and credit card statements showing ATM, credit card, and debit card activity. Students with joint accounts should consult with the Residence Affairs

Unit. The credit card receipts need not be signature copies. The foregoing items are primary indicators of physical presence and will be weighted heavily in determining your status. Items such as copies of lease agreements, rent or utility checks, etc., are much lesser indicators of physical presence and are not acceptable alone.

- Your intent will be questioned if you are absent from California for more than 21 total days during the period in which you are establishing resident status for tuition purposes. Graduate students who are planning to travel outside California for more than 21 total days during nonacademic periods should visit the Residency Affairs Unit at 120 Sproul Hall to seek guidance prior to filing for classification and leaving the state.

Please note this summary is not a complete explanation of the law regarding California residency. For more details and the latest regarding CA Residency requirements, please review the [Office of the Registrar's site for CA Residency for Tuition Purposes](#).

## E.3 Declaration of Advisor Forms

Please select the correct form from below based on the affiliation of your primary research supervisor.

### E.3.1 Declaration of Advisor (Physics Advisor)

Complete [this form](#) with your research advisor at the time that you join a research group. Use this form only if your advisor has a faculty appointment in the Physics Department.

### E.3.2 Instructions for Declaring an Outside Advisor

Find the [instructions for declaring an outside advisor here](#). Your primary research supervisor is considered an “outside advisor” if they meet the following criteria:

They do not currently hold a professor title within the Physics Department

**AND**

- a. they hold a faculty appointment in another academic department, either at Berkeley or at another university, **OR**
- b. they are a staff scientist at a National Laboratory (e.g. LBNL or Livermore) or at the Space Sciences Lab.

## E.4 Grad Student Pay Plan

The Physics Grad Student Pay Plan describes the funding amount (via salary, stipend, and other sources) that students should expect to receive on a yearly basis, based on status and progress within the PhD program. View the [current Grad Pay Plan here](#).

Students should review the pay plan every semester to understand their annual funding. If questions persist after reviewing the document, students should reach out to the GSAOs.

## E.5 Building Access

The Physics building complex is made up of Physics North and South, and Birge Hall. Physics graduate students can establish after-hours access to all three buildings, as well as the dedicated graduate reading room (448 Birge Hall) and lounge (101 Physics South).

To establish access, graduate students should complete the [Physics Complex Access form](#). The form will enable the Service Desk staff to activate keycards for entry.

Requirements:

- Students must have a Cal 1 Card to complete the access request.
- Students must complete all of the required safety training (as indicated on the form).
- If students don't have a Physics research supervisor, list Christian Natividad as your supervisor on the form.

After completing the building access form and any related requirements, students should take a screenshot of the form confirmation message and email it to GSAO [Christian Natividad](#). Students will then receive confirmation of updated records and the ability to make a service desk appointment (151 Physics North) to finalize the process. Building access requests are processed in seven to ten days.

## E.6 DSP Accommodations

The [Disabled Students' Program](#) (DSP) at UC Berkeley provides a wide range of services, including federal and state legally mandated services and accommodations for eligible students with verified disabilities, non-mandated services, and exam proctoring services for faculty. Students with disabilities should reach out to DSP, who will work with the student on potential letters of accommodation (LOA). To start the academic accommodation process, please begin the DSP [application process \(application site\)](#).

It is highly recommended that students reach out to the DSP office to initiate the accommodation process as soon as possible. A backlog of cases can accumulate every semester so obtaining an LOA early in the semester is key to securing reasonable accommodations. First-year students who believe they may qualify for academic accommodations should reach out to DSP during the summer before they enroll at Berkeley.

## E.7 Other employment outside of GSI and GSR appointments

GSI and GSR appointments comprise the bulk of salaried funding during the academic year. However, there may be other funding opportunities within the department, across campus, and outside of the UC setting. If you are seriously considering employment outside of the department, and especially outside of the UC setting, please let the GSAOs know. They will be able to advise on potential funding impact and any relevant university policies.

### E.7.1 Readers

On occasion, the Department may need Readers for additional course support. Reader duties primarily consist of the grading of student papers and examinations. Duties may also include consultation with the instructor, and other course-related duties. Readers may not perform teaching duties. Available Reader positions will be announced via email and during the GSI application process. Reader wage rates are listed on the [Labor Relations site for current rates](#).

## E.8 Qualifying Exam: Best Practices

**Purpose of the exam.** The exam serves to demonstrate a student's readiness to start a research project, "to ascertain the breadth of the student's comprehension of fundamental facts and principles that apply to at least three subject areas related to the major field of study and whether the student has the ability to think incisively and critically about the theoretical and the practical aspects of these areas." (Graduate Division). "Not only teaching, but the formal interaction with students and col-leagues at colloquia, annual meetings of professional societies and the like, require the ability to synthesize rapidly, organize clearly, and argue cogently in an oral setting. It is necessary for the University to ensure that a proper examination is given incorporating these skills."

**Timing:** The exam should be taken after finishing all course work (exceptions can be approved by the HGA, but in no case can the student advance to candidacy before finishing all courses), 1-3 semesters after identifying a research adviser. We recommend students to take the exam as early as possible, usually by the end of their

third year in graduate school. Students who do not attempt the qualifying exam by the end of their fourth year are not making adequate progress and may be placed on probation.

**Format:** The qualifying exam is an oral exam. The committee usually consists of three physics faculty members (the advisor, an experimentalist, and a theorist) and one outside member. The advisor cannot be the chair. An additional member can be added which is useful, e.g., if the student has an advisor from outside the Department, or if an interdisciplinary project requires a broad panel of experts.

The exam has two sections, each typically 1 - 1.5 hours long, separated by a short break. In the first, the student presents the proposed research project. The committee will ask questions frequently; the presentation is a springboard to a freewheeling discussion during which students should expect to answer a host of questions both about their research specialization and about other areas connected to their subfield. Experience suggests that a talk planned for an uninterrupted 30-40 minutes will easily fill one hour. The first 10 minutes should broadly define the purpose of their research, and the talk should be pedagogical and be aimed at someone who is knowledgeable about their subfield (e.g., atomic physics, particle physics, ...) but is not an expert in the area of their talk.

The second part is a broad examination on three topics, suggested by the student, related to the student's field of study. Three nested topics are fine, so long as they include sufficient breadth and do not narrowly focus on the student's research (e.g., WIMP detection - dark matter – cosmology). As a guide, students should be prepared to answer questions on the topics covered in graduate-level courses in their research area, in addition to more specialized questions on the topic of their research.

The separation into two parts is not strict, and students should expect questions during their research presentation, both about specific details and of a more general nature. Likewise, students may be asked about their research specialization during the second half of the examination.

**Content:** The specific topics of the exam are expected to be related to the student's research field, but to be broad in nature. For some past exam problems, as recorded by one physics faculty member (and thus not necessarily representative across the Department), see Budker and Sushkov, "Physics on your feet, or, Ninety minutes of shame but a Ph.D. for the rest of your life!" (Oxford, University Press, 2015), available at <http://oskicat.berkeley.edu/record=b23128497~S1>. Students are not expected to have ready answers to the questions, but rather to work out the answer, displaying their background knowledge and their ability to develop a solution and "think incisively and critically". In addition, there may be focused questions about the student's field of

research, such as about techniques and instruments, or methods used by other researchers.

**Possible outcomes:** Pass, partial failure (pass one section but fail the other), or failure. Students are allowed one repetition. In the rare case of a full failure, however, the committee may recommend re-examination or dismissal, which would have to be reviewed by Graduate Division (This is a graduate division policy: <https://grad.berkeley.edu/policy/degrees-policy/#f27-qualifying-examination-results>)

**Preparation:** Most partial fails result from students being over-prepared for the first half of the exam but under-prepared for the second half. Students are therefore encouraged to focus their preparation on general knowledge related to their research topic instead of preparing polished presentations. Talking to students who already took the exam and holding a practice session are also good ideas.

**Setting the bar appropriately high.** Committees are encouraged to assign a partial fail if the student does not demonstrate sufficient understanding of concepts at the graduate-course level or ability to think critically through questions in either part of the exam. The committee should then give the student detailed feedback and agree on specific topics to prepare for the re-examination, in order to not discourage the student or unduly extend the student's timeline to graduation. The message is not that the student is unqualified for, and unable to complete, graduate work, but rather how the student can qualify better with more preparation, and that this preparation has long-standing benefits.

**Communicating detailed expectations:** The research adviser, in conjunction with the appropriate subgroup of the physics department, should provide detailed guidance about the content of both parts of the exam. Such guidance can consist of written listings of topics, books, papers, and/or courses that the student should be familiar with. There is no one-size-fits-all approach - individual subgroups of the Department should decide what their requirements are and whether they should be uniform across the subgroup or left for individual research groups/advisers to decide. However, at a minimum, they should have clear written expectations that are available to students, or find another way to specify their requirements in a way that is equally clear.

# GRADUATE STUDENT GUIDE

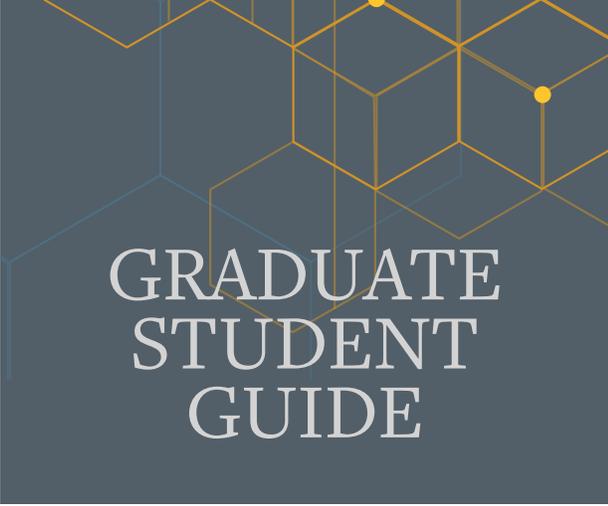
Physics  
@BERKELEY

**THIS AT-A-GLANCE GUIDE** shows the essential milestones and timeline of your Ph.D. The table below shows the approximate, recommended timing of milestones, but the program is flexible enough to allow for an individual's unique circumstances. Faculty and staff advisors are here to help!

## An approximate timeline of milestones

MILESTONE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
PRELIM EXAMS						
DECLARING ADVISOR						
QUALIFYING EXAM						
SHORT QUAL PROPOSAL						
POSTER PRESENTATION						
IDENTIFY FINAL YEAR						
SUBMISSION OF T.O.C.						
SUBGROUP TALK						
SUBMISSION OF THESIS						

*See reverse for more detailed information on each milestone.*



# GRADUATE STUDENT GUIDE

## Preliminary Examination

The Preliminary Examination is a written exam composed of four sections: (1) mechanics, (2) electricity and magnetism, optics, and special relativity, (3) thermal and statistical physics and (4) quantum mechanics. All sections are offered at the beginning of each semester. The Department expects you to pass all sections within the first three semesters of graduate study.

## Required & Elective Coursework

The PhD requires completion of 38 approved course units. This consists of 19 units of required courses plus 19 elective units. Ideally, you should complete your coursework prior to applying for the qualifying exam, but exceptions can be made so that an approved delay of coursework will not unnecessarily delay the qualifying exam.

## Advisor Declaration

When you are ready, you and your advisor submit documentation to the Department indicating that you have (provisionally) joined the advisor's research group with the intent of working towards a PhD. This would be an excellent opportunity to discuss the advisor's graduation requirements.

## Qualifying Exam + Short Qual Proposal

Within 2-3 semesters of beginning research, the Department expects all students to take the oral Qualifying Examination covering both the field of research and related areas. Passing signifies readiness to undertake dissertation-level research. One week before the exam, you should submit a 1-2 page summary of your research plans for the upcoming year to the exam committee. You should articulate your proposed research in scientific language and make a case for it, similar to what you would be doing as a professional researcher.

## Poster Presentation

You will prepare a poster of your research and present it at a departmental poster session on campus. The primary audience is current undergraduate students or prospective graduate students.

## Identification & Declaration of Your Graduation Semester

Together with your dissertation committee, determine where you are on your journey and decide on your (non-binding) target semester for graduation.

## Submission Of Dissertation Table Of Contents

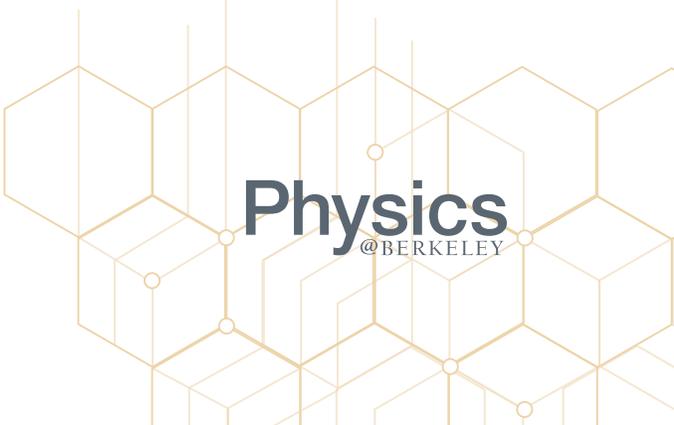
Lay out the big picture of your body of research and work with your committee to ensure you are on track to complete a satisfactory dissertation. Submit your table of contents to your advisor and other dissertation committee members and solicit their feedback.

## Sub-Department Research Presentation (“Subgroup Talk”)

In your final year—six months or more prior to graduation—give a talk on your research achievements. Address your professional colleagues in your field of expertise, demonstrate your ability to communicate complex ideas, and celebrate your transition to becoming a professional scientist. Discuss the format with your thesis advisor, but as a rule, it should mirror a presentation in a professional setting.

## Dissertation Submission

Submit your final dissertation to the Graduate Division and graduate! Unless you have made special arrangements with the committee, allow at least six weeks for the committee to read the dissertation and suggest changes.



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