

Guidelines for Physics Comprehensive Exams

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Purpose of this Document

The Physics Department provides guidelines, noted below, for the Comprehensive Exam required of all Physics Ph.D. students. Here I elaborate on some of these points, especially with respect to past work in the student's field and future plans related to skills and careers. Based on considerable experience on thesis committees, I think that preparing to discuss the "enhanced" guidelines I describe below will help students progress as quickly and painlessly as possible towards a successful dissertation and graduation.

For students whose committees I'm chair of, the current departmental guidelines and my additional guidelines should be considered **requirements**.

Departmental Guidelines

Copied from <https://physics.uoregon.edu/3299-2/>, Dec. 6, 2019

The comprehensive examination will be administered by the Comprehensive Exam Committee (see below). The purpose of the comprehensive exam is for the student to exhibit sufficient background knowledge in the area of their thesis research in order to demonstrate the feasibility of their thesis subject. It is not expected that the student will have complete mastery of their thesis subject.

Before the Comprehensive Examination, the student will prepare a written presentation of a current problem in physics and a proposal for a research project related to that problem. The Committee Chair will request this document and specify a deadline for its submission, typically one week before the exam date. At the Comprehensive Examination, the student will present this material orally. The committee will question the student on the subject of the presentation and related physics issues. The examination will be closed to the public. The student is expected to understand the background and fundamental physics of the problem area and to communicate this knowledge to physicists in other fields. The student will be judged on his or her understanding of the problem, ingenuity, and ability to apply his or her knowledge in the proposed research area. If minor deficiencies emerge as a result of the oral examination, the committee may require additional work, oral examination, or written material. Deficiencies must be rectified within six months for a successful pass of the Comprehensive examination.

Elaboration and Additional Guidelines

Literature / Annotated Bibliography

It's important to be familiar with the literature in your field, not only because it describes important concepts and methods, but also because it presumably contains gaps that your work will address. What are major theoretical concepts underlying your proposed work? What are important experimental methods and how will you apply them? Be ready to discuss the state of the field.

In addition, submit along with the written proposal an **annotated bibliography** – a list of 10 key papers from the primary literature (i.e. not review papers), each with a few-sentence summary of the paper's results and significance (i.e. why the paper is included in your bibliography).¹

Timeline

As best as you can, provide estimates of the timelines of various aspects of your dissertation project, other degree requirements, career preparation activities, etc. No one expects you to exactly follow these timelines, but it's often useful to sketch expectations, think about them, and then revise them as needed in the future. Items on these timelines might include learning experimental techniques, writing papers, finishing course requirements, investigating career options, etc.

Mentoring and Exam Format

It is expected that the student's advisor will provide guidance on all aspects of the exam preparation, including training the student to explore relevant literature.

Though the primary goal of the Comprehensive Exam is to assess the student's preparedness for dissertation research, it also aims to help with any issues that may exist in the advisor/advisee or student/research group relationships. The Exam Committee should be considered a resource for students. (This has been an important role on several committees I have been on.) The meeting, therefore, will have the following format, commonly used in dissertation committee meetings: (1) The student will leave the room and the committee will discuss the student's progress and any issues that are important to address. (2) The student will return and will present their proposal, aiming for approximately 30 minutes. With questions and discussion, this will likely be around 60 minutes long. (3) The student will leave the room and the committee will assess the exam. (4) The student will return and the advisor will leave the room; the student and the rest of the Committee will discuss any issues or concerns.

Length and Deadline

I suggest at most 5 pages, including figures, for the written report, with an additional page or two for the annotated bibliography. The written report and annotated bibliography must be submitted to all committee members **one week before** the Comprehensive Exam date.

¹ I've lifted this from the Biology Department Graduate Handbook; from experience, the annotated bibliography is an excellent thing to do.