

A Guide to the Physics
Candidacy Exam

USU Physics Department

(Updated June 6, 2018)

CANDIDACY EXAMINATION REQUIREMENTS AND GUIDELINES

I. OVERVIEW OF THE EXAM

The Candidacy Exam is the Physics Department's last evaluation of the student's suitability to pursue a PhD degree. It is designed to provide the department a means to evaluate the student's ability to participate in the world of physics research. The exam does this by having the student study the research literature on a particular physics topic and then educate the Physics faculty about that topic.

There are three components to the exam:

- a written report of the material that will be presented in an oral presentation
- an oral presentation (including time for faculty questions) on a research topic
- deliberation and voting by the faculty.

II. PRIOR TO THE EXAMINATION

It is suggested that the student schedule two to three months of preparation time for the examination. The summer between the student's fourth and fifth semesters is the standard time for exam preparation.

A. Setting the Topic

In the **fourth semester** the student's Supervisory Committee shall set, in writing, the research topic to be explored. The PhD candidate, the major professor, and Supervisory Committee may all participate in the topic selection process. There are no constraints on who chooses the topic as long as the committee ratifies it unanimously.

However, the topic is constrained by the following: (i) The topic should **not** be material that is normally taught at the 6000 or 7000 level. (ii) The topic should **not** be esoteric to the point that the majority of the USU Physics Department faculty are unable to participate in the Exam. Assessment of this guideline is the responsibility of the Supervisory Committee. (iii) The topic can, **but need not**, be a future aspect of the candidate's research.

The Supervisory Committee plays a key part of the student's preparation for the Candidacy Exam. In addition to setting the topic, the committee is responsible for helping the student understand the difference between course-based learning and research, the latter being the topic of the Candidacy Exam. The candidate may discuss his/her readings and thoughts as often as necessary with the major professor and committee in preparing the oral presentation.

At the time that the topic is set by the committee, the student shall give the signed *Intent for Candidacy Exam form (ICE form)* to the Department Advisor. The form must be signed by all Supervisory Committee members.

B. Oral Presentation Prerequisites

To proceed with the oral phase of the Candidacy Exam the student must meet the following prerequisites.

- The required PhD courses have been completed.
- A minimum 3.0 GPA has been maintained in these courses.
- The student has passed Qualification at the PhD level.
- A Program of Study is on file with the Graduate School.
- The written report component of the exam is completed.

As the Candidacy Exam is a formal examination of the candidate, **only** the candidate and faculty members may be present during the oral presentation. **The exam should take place during the student's fifth semester.**

If all 5 of these prerequisites have been met, then with the help of the Department Advisor the student will schedule the oral exam. **Seven days before the oral exam the Department Advisor will distribute (i) the student's ICE form and (ii) the written report to all Physics faculty and Supervisory Committee members.** The ICE form shall indicate the scheduled date, time, and place of the oral presentation. Both the ICE form and written report must be distributed 7 days in advance of the oral presentation in order for the oral presentation to proceed.

III. WRITTEN REPORT

As part of the examination the candidate shall prepare a written summary of the material that is to be discussed during the oral presentation. The written report should include an abstract, appropriate figures and/or tables (including captions), and references. It is strongly recommended that the APS style manual,¹ AGU style guidelines,² or other appropriate style guidelines be followed when writing and formatting the document. The length of the document should be sufficient to lucidly convey the subject matter to the faculty.

The major professor and committee may not write nor rewrite any parts of the written report. However, if the committee finds a working version of the report unsatisfactory, they may certainly guide the student in making improvements to the document.

In order that the faculty have sufficient time to evaluate the report, it shall be made available to the faculty a minimum of 7 days before the oral examination. As discussed above, it shall be distributed with the ICE form, which announces the date and time of the oral-presentation component of the Candidacy Exam.

IV. ORAL PRESENTATION

The oral phase of the exam shall normally take place during the fifth semester that the student is in the Graduate Program. The Physics Department faculty-meeting time slot (3:30 p.m. on Thursdays during the fall or spring semester) is the standard time for these examinations, and the exam is normally held in the Physics/CASS conference room.

¹ <http://www.apsstylemanual.org/>

² http://www.agu.org/pubs/authors/manuscript_tools/journals/style.shtml

Only Physics Faculty, the student's Supervisory Committee, and the candidate may attend the oral examination.

Visual aids of the standard type are acceptable – viewgraphs, slides, or computer-aided presentations. A white board is available in the conference room. In the case of a handicapped candidate, the department will comply with all Federal regulations and common sense.

The oral presentation formally consists of two parts:

1. An uninterrupted 45-minute talk by the candidate on the subject set by the Supervisory Committee. The student begins the oral part of the exam by making an **uninterrupted** 45-minute presentation. The one exceptional interruption will be a "three-minute" warning by the Exam Chairperson, so that the candidate may make concluding remarks.

2. A 30-minute period of questions (from the faculty) addressed directly to the candidate. At the end of 45 minutes, which will be the maximum time allotted by the chairperson, a 30 minute question session begins. Questions must be germane to the subject presented by the student in the written report and/or the oral presentation, and **must be directed at the student** only. The chairperson will control the time permitted for each faculty member's questions. At exactly the 1 hour, 15 minute mark the oral presentation is over and the student leaves the room.

The oral presentation requires a quorum of faculty members to be present. A quorum consists of the following:

- The student's major professor.
- The Supervisory Committee external member.
- Two of the remaining three Supervisory Committee members.
- The chairperson of the exam, who is normally the Department Head. The Assistant Department Head **must** substitute for the Department Head if the Department Head is the student's major professor. The Assistant Department Head **may** substitute for the Department Head if the Head is unavailable.
- Three other physics faculty members.

To ensure that a quorum is available, tenured and tenure-track faculty are required to attend if they are not on travel leave. The quorum is hence 8 faculty members with balanced graduate-committee and general-faculty representation. If the exam chairperson is on the student's supervisory committee, then the quorum consists of 7 faculty members. The exam chairperson may not be the student's major professor.

V. DELIBERATION AND VOTING

The deliberation and voting phase of the Candidacy Exam commences immediately following the oral presentation. This part of the exam formally consists of two parts:

- **A 15-minute discussion among the faculty to clarify the Candidacy Exam performance of the candidate.** This discussion is limited to aspects of the Candidacy Exam – the written report and the oral presentation. The single goal of the discussion is to clarify the correctness of (i) the material presented and (ii) the student’s responses to questions from the faculty. The discussion may **not** digress to other aspects of the student’s performance in the PhD program.
- **An anonymous pass/fail vote by the faculty.** Each faculty member in attendance then marks a secret pass/fail ballot that is immediately given to the chairperson. **All faculty present are required to vote either pass or fail.** The chairperson tallies the ballots and informs the faculty and student of the result before the 1 hour, 35 minute mark. A **majority** of passing votes or a **tie vote** is required to pass the exam.

The faculty present are to make their judgments based on the written report, the oral presentation, responses to the questions, and the subsequent interfaculty discussion. In order to help the faculty assess the student’s performance on the exam, it is suggested that the faculty judge the exam using the following criteria:

- Both the report and talk had a proper balance of introductory and in-depth material.
- The level of the material presented in both the report and talk was appropriate for all faculty present.
- The candidate demonstrated mastery of the material presented, **especially an understanding of the physics germane to the topic.**
- The report and talk contained assessment, discussion, conclusions, and summaries that represent the candidates own interpretation of the subject.

VI. EXAM FAILURE

If the student fails the exam, it is the task of the faculty to decide the student's fate, which may include another attempt at the exam or expulsion from the graduate program.

CANDIDACY EXAM CHECKLIST / PRESENTATION GUIDELINES

I. CHECKLIST

The following list summarizes details associated with Candidacy exam.

- During the fourth semester of graduate study, meet with your Supervisory Committee to set the exam topic. **Make sure that all prerequisites for taking the oral exam are on track.**
- Submit the ICE form to Department Advisor (to be done **immediately** after the topic is set).
- Schedule 2 to 3 months for exam preparation, including the writing of the written report.
- Work with the Department Advisor to schedule the oral presentation. The presentation should occur during your **fifth semester.**
- Make sure that the written report and the ICE form (with time, date, and location) are distributed **7 days** in advance of the oral presentation.
- Get a good night's sleep before the oral presentation!

II. GUIDELINES

The following list summarizes the components that are critical for a successful candidacy exam.

- Your job is to educate the faculty on your assigned topic, of which you should be the expert. The level of both the written report (oral presentation) should be at that of a review article (colloquium), **not** a high-powered research paper (research seminar).
- As you prepare both aspects of the exam, frequently consult the criteria that the faculty will be using to judge the written report and the oral presentation (see the ICE form below).
- Carefully follow APS, AGU, or other appropriate style guidelines when writing the report.
- The length of the report should be sufficient to lucidly convey the subject matter to members of the faculty.
- For the oral presentation use 15 – 20 minutes for introductory material and 25 – 30 minutes for in-depth discussion.
- When using viewgraphs or slides for the oral presentation, make sure that each one has on it exactly what you want. **Try to base a 45-minute talk on no more than 15 viewgraphs.** Often the best talks have the fewest viewgraphs.
- Do not introduce any material that you do not understand or cannot defend. **Anything** that you present in the written report or oral presentation is fair game for questions.
- **Practice, practice, practice** your oral presentation!