The University of Calgary Graduate Candidacy Regulations ("the Regulations") govern the conduct of admission to graduate candidacy at the University of Calgary. This document establishes program specific requirements associated with the conduct of admission to graduate candidacy under the Regulations.

A. Statement of Purpose
Admission into candidacy in the Physics and Astronomy Graduate Program signifies that students are able to think critically about and effectively communicate their research projects and evaluate their merits in the context of their research discipline and the broader fields of physics and/or astronomy and society as a whole. Specifically, students must be able to:

- Review and synthesize the body of literature pertinent to the student’s field of study
- Construct a well-planned research proposal that addresses gaps in current knowledge
- Communicate comprehensive knowledge of the specialized subject matter using impromptu oral arguments supported by calculations and diagrams as necessary and demonstrate competency in the core fields of physics (classical mechanics, quantum mechanics, statistical physics, electricity and magnetism)

B. Terminology
1. Examination Committee: All examiners apart from the neutral chair as described in the Composition of the Examination Committee in section C below form the Examination Committee.
2. Pre-Candidacy Meeting: This meeting is the first of two meetings in the candidacy process as described in Format of the Pre-Candidacy Meeting, section C.
3. Field of Study (FoS) Oral Examination: This is the second of two meetings that makes up the candidacy process as described in FoS Oral Examination in section C.

C. All doctoral students in the Physics and Astronomy Graduate Program must successfully complete the following components to be admitted into Candidacy:

1. All course requirements.
3. A Field of Study (FoS) Oral Examination.

Overview of Candidacy Component Time Line
A Physics and Astronomy doctoral student in consultation with their supervisor decides on an appropriate date for the Field of Study Oral Examination. The student must take the Field of Study Oral Examination no later than 28 months after their first registration as a doctoral student in the Faculty of Graduate Studies. A Pre-Candidacy meeting (see below) must be held at least 6 months before the Field of Study Oral Examination. The first annual supervisory committee meeting may also act as a Pre-Candidacy meeting; otherwise, a separate Pre-Candidacy meeting must be held, normally within 22 months of registration in the program. Figure 1 shows a timeline of the expected elements that need to be completed after the student has completed all required courses for their program.
Figure 1. PHAS PHD Students. Timeline outlines the process and steps for students and supervisors for the Thesis Proposal, Pre-Candidacy Meeting and Field of Study (FoS) Oral Examination.
Composition of the Examination Committee
A neutral chair, assigned by the Graduate Program Director, will chair the Field of Study Oral Examination. The examination is conducted by an approved Examination Committee. This committee will consist of the supervisory committee members and two additional Examination Committee members chosen by the supervisor in consultation with the student. At least one of these two additional Examination Committee members should be external to the department. All the Examination Committee members attend the Pre-Candidacy meeting (see below).

Written Thesis Research Proposal
Students will prepare a complete draft of a 5-page written thesis research proposal and submit copies to their Examination Committee at least 1 month prior to the planned date for the Pre-Candidacy meeting. The student will also provide the departmental graduate studies office with a copy of the proposal.

The proposal should be 5 pages, including figures, diagrams, etc. (excluding references). The first section of the proposal should be devoted to describing the relevance of the project and the background of the research and literature that forms the basis of the proposal. The remainder of the proposal should describe the proposed research including any relevant results to date, expected results, and a description of how specific techniques or experiments will answer specific questions.

There is no requirement that, for the completed thesis, all the proposed research be successfully carried out. Conversely, completion of the proposed research will not necessarily signify that all thesis-related research requirements have been met.

Format of the Pre-Candidacy Meeting
The Pre-Candidacy meeting (see Figure 1) allows the Examination Committee members to comment on and highlight to the student and supervisor those areas where the student has weaknesses and strengths and to identify areas for further study. The written Thesis Research Proposal will also be discussed (rating Pass or Revise) at the Pre-Candidacy Meeting.

Normally within 22 months of first registration as a Ph.D. student, the supervisor and the student will organize a Pre-Candidacy Meeting of the Field of Study Oral Examination Committee. This meeting will serve as an informal evaluation of the thesis proposal and an opportunity for the student to gain practice in responding to questions about their research for the Field of Study Oral Examination. The student and supervisor may decide whether or not to have an oral presentation at the start, and the meeting will last approximately 90 to 120 minutes.

At the Pre-Candidacy meeting the committee will
1. Have an informal discussion and question and answer session about the written thesis proposal which may last up to 60 minutes.
2. Provide a confidential vote to the supervisor as to whether the written proposal (not the student’s oral description or discussion) is a Pass or Revise. If the majority of the committee members vote Pass, the written thesis proposal is passed and the student is ready to proceed to the Field of Study Oral Examination. If there is a tie, then the vote of the primary supervisor determines the outcome, Pass or Revise.
3. Decide on the areas of physics and astronomy, both general and specific to the student’s area of research, that the student will be examined on during the Field of Study Oral Examination. Define a list of approximately five topics relevant to the student’s field of research, but go significantly beyond the project itself, as described in the Pre-Candidacy meeting form. The two additional members for the Pre-Candidacy meeting will be present so that a less invested view is provided.
It is expected that the committee will identify relevant subject matter, text books, literature, etc. necessary for the student to study for the Field of Study examination. The supervisor will complete, in conjunction with the Pre-Candidacy committee at the Pre-Candidacy meeting, the “Pre-Candidacy Meeting Form”, listing both the topics for examination and also the levels of understanding which will be expected. This form will be reviewed by the Graduate Program Director (GPD). If the amount of material is deemed either insufficient or excessive relative to department norms, the GPD will contact the supervisor to suggest revisions. The Pre-Candidacy Meeting form and the list of topics, as well as a list of suggested reading material, is provided to the student no later than one week after the completion of the Pre-Candidacy meeting.

Written Thesis Proposal Examination

Evaluation of the Written Thesis Research Proposal
The examination committee will have 1 month to review the complete draft of the written thesis proposal before the Pre-Candidacy meeting and will submit comments to the supervisor as well as a confidential vote for Pass/Revise at the end of the informal question and response portion of the meeting. The evaluation is based on the student’s ability to successfully follow the required format of the proposal and to articulate in writing the various aspects of each required component as described in the previous section (“Written Thesis Research Proposal”).

After the Pre-Candidacy meeting the supervisor will summarize the committee’s comments in writing to the student, and convey the collective decision as to whether the written thesis proposal receives a Pass or Revise. If at most two of the committee members and the supervisor vote revise, the student will have the opportunity to revise and resubmit the thesis proposal to the committee within 2 months of the Pre-Candidacy meeting for re-evaluation. All committee members have the opportunity to review the revised proposal and respond to the student’s supervisor by email within two weeks to vote Pass/Fail. Once there is agreement amongst a majority of the committee members that the written thesis proposal is acceptable, the date for the Field of Study Oral Examination can be set. In the event of a tie, the primary supervisor’s vote will determine the outcome. If the written research proposal receives a fail at this stage, the student will be required to withdraw.

Appeal to a Failed Written Thesis Research Proposal
In the event that the revised thesis proposal is a “Fail” from a majority of committee members, students may appeal the decision in writing to the Faculty of Graduate Studies. Please see the Faculty of Graduate Studies Calendar, section O. Appeals –O.2 Appeals Against Faculty of Graduate Studies Rulings.”

Field of Study (FoS) Oral Examination

The Field of Study Oral Examination examines the student’s ability to articulate logical and coherent impromptu responses to the Examination Committee’s questions within the Field of Study. The examination is comprised of rounds of questions from the Examination Committee to the student. Only members of the Examination Committee are allowed to question the student. All examiners will be given an opportunity to question the student. Normally, two rounds of questioning are held within the maximum oral examination time of 2 hours, which includes the student’s 15-20 minute presentation. The Examination Committee discussion may proceed beyond the 2 hours, but the student examination may not.
At the beginning of the Field of Study Oral Examination, the neutral chair will ensure that the Examination Committee is aware of the format (described in the following sentences) for the oral examination. Questions during the early part of the oral examination will focus on details and background founded on material described within the written Thesis Research Proposal, and then will extend to an examination of the student's general background knowledge in the sub-discipline(s) of physics and astronomy (Field of Study) (five topics) as described in the pre-candidacy meeting form.

Questions to the student should be clear and succinct. The student should be given reasonable time to answer. If the student has understood the question and cannot answer, the examiner should pass to another question and not attempt to extract an answer by prolonged interrogation, or by leading the student. The chair should guard against any tendency of examiners to interact with each other, instead of concentrating on the examination of the student.

At the end of the examination, the student is asked to withdraw from the room while the committee deliberates on the student’s performance on the examination. Before any discussion of the student’s performance, each examiner must give their preliminary recommendation of Pass or Fail of the oral examination by secret ballot. This provides the committee a frame of opinion upon which to base a full discussion of the student's performance in the oral examination. The examiners then conduct a post-examination discussion, where each is to give their input on the student’s performance on the oral examination. The examination committee will base their decision on the student’s ability to effectively communicate and demonstrate both a comprehensive knowledge of the specialized subject matter listed in the Pre-Candidacy meeting form. Upon the final vote, each examiner must declare a recommendation of Pass or Fail on the student’s performance. The supervisor is a voting member. The neutral chair is a non-voting member. Every effort should be made to reach a unanimous recommendation. The result is communicated to the student directly after the examination.

Evaluation of the Field of Study Oral Examination
If the committee evaluation results in 2 or more “Fail” votes, the committee’s recommendation is “Fail”. Within five working days of the failed examination, the Neutral Chair must submit a written report of the procedures, and each committee member must also provide a written report explaining the reasons for their vote, to the Graduate Program Director. The final decision will be at the discretion of the Graduate Program Director. Then, after consultation with the Supervisor, the Graduate Program Director summarizes the essential points and the final decision to the student.

Appeal to a Failed Candidacy Oral Examination
Students who fail the oral Field of Study component of the Candidacy requirements may appeal the decision in writing to the Faculty of Graduate Studies. Please see the Faculty of Graduate Studies Calendar, section O. Appeals – O.2 Appeals Against Faculty of Graduate Studies Rulings.” In the event that the recommendation is to uphold the decision of "Fail", the student can be allowed one re-take of the examination as per below.

Re-Take of the Candidacy Oral Examination
Only one re-take of a Field of Study Oral Examination will be permitted. The re-take must take place no sooner than two months and no later than six months from the date of the first examination. Normally the composition of the examination committee will remain the same.

In reporting the results of the re-taken Field of Study Oral Examination, the committee will again be limited to recommending either a Pass (i.e. no more than one negative vote) or Fail. A recommendation of "Fail" requires that, within five working days, each examiner must submit a confidential written report to the Graduate Program Director, detailing the reasons for their vote. The Neutral Chair must also submit a written report of the examination procedures to the Graduate Program Director in that time. If the
Graduate Program Director upholds the recommendation to fail, the student will be required to withdraw from the Faculty of Graduate Studies and this decision will be communicated to the Dean of Graduate Studies.

**Advancement**
A “Pass” on the Field of Study Oral Examination in combination with a “Pass” on the Written Thesis Research Proposal advances the student to the category of "Candidate for the Ph.D." in the Physics and Astronomy Graduate Program.
Department of Physics and Astronomy
Pre-Candidacy Meeting Form

Name of Student: _______________________________________________________

Start Date: ______________________ Meeting Date: ________________________

Supervisor/Co-Supervisor: _______________________________________________

Thesis Research Proposal Title: ___________________________________________

1. Thesis Research Proposal Evaluation – *an oral discussion*

   Thesis Research Proposal Final Vote Result (please check):
   _______ Pass    _______ Revise

   *In the event of a “revise” result, the due date for revisions to the Thesis Research
   Proposal is two (2) months from the Pre-Candidacy Meeting date. Insert Revision Due
   Date Here: ____________________

2. Provide feedback on the research project presented by the student.

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3. Assess and provide feedback on the student’s background knowledge.

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Please turn over for Part 4
4. Based on 2. and 3., define a list of approximately five topics that will form the basis for the background questions in the candidacy exam. They should be relevant to the student’s field of research, but go significantly beyond the project itself. This list should also indicate the expected level of knowledge for each topic. It may include suggestions for how to acquire this knowledge (relevant courses, books or book chapters, research and review articles etc.). *Approximate time on this component is 30 minutes minimum.*

Supervisor’s Name: ____________________________ Signature: _______________________________

Co-Supervisor’s Name: __________________________ Signature: _______________________________

Supervisory Committee Member Name: __________________________ Signature: _______________________________

Supervisory Committee Member Name: __________________________ Signature: _______________________________

Supervisory Committee Member Name: __________________________ Signature: _______________________________

FOS Examination Committee Member Name: __________________________ Signature: _______________________________

External FOS Examination Committee Member Name: __________________________ Signature: _______________________________

This form is due to the Graduate Program Coordinator (SB 605) no later than one week after the pre-candidacy meeting. The list is official once it has been approved by the Graduate Program Director.

Graduate Program Director’s Name: __________________________ Signature: _______________________________

Date: _________________________________