The PhD Qualifying Examination in Applied Mathematics
Harvard John A. Paulson School of Engineering and Applied Sciences (SEAS)

This document sets forth guidelines for the structure of the qualifying examination for students in Applied Mathematics, supplementing the description of the exam in the SEAS "Policies of the Committee on Higher Degrees" document [Policies of the CHD]. It is intended for students preparing for the exam as well as for members of the student's examination committee.

Purpose

The purpose of the qualifying examination is to:

- verify the adequacy of the student's ability and preparation to perform doctoral-level research
- assess the student's ability to synthesize technical knowledge already acquired
- determine a student's depth and breadth of scholarship in a chosen area of application
- determine the student's capacity for originality, synthesis and critical examination; intensity of intellectual curiosity; and clarity of communication.

Preparation

The student, in consultation with his or her advisor, selects an area of application in which the student has done some research and taken appropriate courses and on which the examination is to be based.

No later than two weeks before the examination, the student must deliver to the committee members a short report outlining the research project to be presented, highlighting the background and motivation for the project, the content and results of the project itself, and a brief survey of related work. No specific format is required for the report, although as a guideline it should be between six and ten pages in length. (The page length guideline is not an absolute requirement, but a recommendation.)

The scope of the research project presented during the exam is not meant to represent mature, publishable research. It is acceptable to present negative or partial results. The intention is not to provide evidence that the student has already done PhD level research, but merely that he or she has the capability to do so. The student is expected to have a full knowledge of the technical material and background for the chosen topic. Both students and advisors should keep these scope issues in mind when selecting research projects and subfields.

Format

The exam typically has two components: First, presentation the research project that the student has undertaken within his or her area of application. During the presentation, the committee will ask questions to probe the depth of the student's understanding of the project.
and related work. If the project has produced preliminary results they can be included in the presentation, however *conclusive results are neither expected nor required*. Second, an oral examination of the student’s technical expertise and breadth of knowledge within the application area.

**Timing**

As specified in the *Policies of the CHD* document, the qualifying examination must be taken by the end of May of the student’s second year of graduate study. No exceptions are made to this deadline without a prior written petition to the CHD.

It is the student’s responsibility to schedule the exam for 2-hour time block when all of the committee members are available. Once a date and time has been agreed upon, the student must contact the Office of Academic Programs by emailing classes@seas.harvard.edu for official scheduling.

**Criteria for Passing the Qualifying Examination**

The outcome is based on the exam committee's determination of the student's ability and preparation for undertaking research in his or her chosen application area. Aspects include:

1. *Did the student demonstrate adequate technical depth?*
2. *Was the quality of the presentation clear, in terms of oral delivery, visual materials, and answers to questions?*
3. *Was the motivation for the chosen research project adequate?*
4. *Did the student present a detailed and thorough discussion of prior work?*
5. *Did the student demonstrate a breadth of knowledge in his or her chosen area, beyond the specific research project presented during the exam?*

All committee members must be satisfied that the student has met these criteria in order to pass the exam. Apart from the presentation and discussion during the examination itself, the committee may use other means at its disposal to determine the outcome of the examination, including a review of the student's full record.

**Outcome**

As stated in *Policies of the CHD*, the qualifying committee may declare the student to have *passed* the exam (perhaps with stipulation of further requirements), to have *failed* the exam, or may declare the result to be *inconclusive*. Typical stipulations include completion of additional coursework, a further oral presentation, or submission of a satisfactory paper for publication by a certain date. In the case of an inconclusive outcome, the committee will specify a future date range (typically between 3 and 6 months, taking term boundaries into account) during which the student may schedule a second examination, the result of which must be conclusive (pass/fail).