This document supplements
http://www.bu.edu/cs/phd-program/phd-program-milestones/
for PhD students in the Algorithms group, specifying how to satisfy the depth requirement and the format of the oral exam. To determine whether the Algorithms track is appropriate, students should consult their advisor.

Depth Requirement

The Algorithms depth exam is intended for those students who plan to pursue a PhD in topics associated with Algorithms.

The depth requirement is to complete 3 advanced topics courses in theory and algorithms, each with a grade of A- or higher. Specific courses which can fulfill this requirement vary from year to year and should be discussed with the student's advisor. Generally, these will be courses that are not on the Breadth Requirement list and that include both a significant problem-solving component and a major course project. In the rare cases, when a course is deemed to satisfy both the Breadth Requirement and the Depth Requirement, the same course can be counted towards both requirements simultaneously. Examples of recently offered courses which would count toward this requirement include:

CS 548: Advanced Cryptography
CS 591: Communication Complexity
CS 591: Sublinear Algorithms
CS 591: Algorithms in Society
CS 591: Privacy in Machine Learning and Statistical Inference

CS 530 (Algorithms), CS 531 (Advanced Optimization Algorithms), CS 535 (Complexity), and CS 537 (Randomness in Computation) **do not** count toward the depth requirement.

Oral Qualifying Exam

At least a month before the exam, the student and their advisor should agree upon a list of about 3-7 research papers for the student to present. The material in these papers should enhance the student's understanding of their research area, but should not play a direct role in their past or ongoing projects. Again in consultation with their advisor, the student will select three faculty members to form an examining committee.

The student's presentation should consist of the following parts: A unified introduction to the papers, setting up the context for the research direction; a detailed technical explanation of a major result from one of the papers; and a conclusion highlighting open questions and other interesting directions that the student identified. The presentation itself should last roughly 45-60

minutes with 30 minutes remaining for questions from the committee about the presentation and about any other details of the chosen papers.

The committee will then meet to discuss the outcome of the exam. Potential outcomes are:
1) The student passes the exam,
2) The student conditionally passes the exam, but must prepare a short written or oral summary of a specific aspect of the presentation to the committee's satisfaction,
3) The student is given an opportunity to retake the exam the following semester, or
4) The student may fail the exam.

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