

Proposal to the Department:

Revising the Pre-Candidacy Exam

I. Proposed Pre-Candidacy Structure:

- (1) The Doctoral Written Exam (DWE) will consist of two parts:
 - (a) Passing the in-class course finals corresponding to the four core courses of CM, EM, QM, and SM.
 - (b) A written research paper to be submitted to and approved by the student's thesis committee before the doctoral oral exam (thesis proposal presentation (TPP), formerly called "prelim").
- (2) The first year courses will be the above core courses, offered on an annual basis, + 2 electives of advanced courses offered on either an annual or bi-annual basis. Electives need to be approved by the faculty, or on an individual basis by the DGS.
- (3) Students are required to form a thesis committee by the end of their second year. Students are required to meet with this committee once a year, providing a written progress report in years without exams (thesis proposal presentation, optional Masters, PhD defense). The progress report will include a written summary of the past year's activities. The thesis committee will provide feedback to the student.

II. Expected Schedule

Year	Courses	Research	Written Assessment [Doctoral Written Exam]	Oral Assessment
1	CM, EM, QM, SM, 2 electives	(Yes) ¹	CM, EQ, QM, SM finals	
2	electives	Yes	Progress report ³	
≥3	(electives) ¹	Yes	Progress report ³	
before TPP ²			research paper	
after research paper				Thesis Proposal Presentation (TPP)

Notes on the table:

- 1 () – optional; A Masters is also optional and would be completed in advance of the Thesis Proposal Presentation.
- 2 Can be completed at any time agreed to by student and advisor after the formation of the student's thesis committee, but must be completed before TPP (see III.2).
- 3 In years without exams (DWE, TPP, defense), students must provide a progress report to their thesis committee (see III.3).

III. Implementation

(1) The DWE (a) : in-class course finals

Type – In class

Duration – 3 hours.

Scheduling – If possible, exams will be held at their normally assigned time corresponding to the university's exam schedule. However, to provide optimum time between exams, the committee recommends to schedule exams two days apart. At the start of the semester the graduate affairs coordinator will review the university exam schedule and work with the course instructors to take any necessary actions to ensure this recommendation is satisfied.

Exam preparation- The course instructor will prepare the exam following the department-approved DWE topic list for that subject, attempting to distribute questions evenly among topics. The exam should be of comparable length to previous (traditional) qualifying exams. Instructors may want to provide an equation sheet to students, to de-emphasize rote memorization.

Advance review and approval of exam – The course instructor will provide the exam to a vetting committee consisting of select faculty and senior graduate students at least two weeks in advance of the scheduled final exam. The senior graduate students will be paid (currently \$25/hour) to take the exam at the start of this time period. The committee will meet and either approve the exam or suggest changes. In the event that the instructor does not agree with the committee's proposed changes, the graduate curriculum chair, the department chair, and the instructor will meet to resolve any differences at least a week in advance of the scheduled exam date.

Grading for the course – the instructor will grade the exam and assign an exam grade for the course. It is entirely up to the instructor how to weigh the exam in regard to the course grade.

Grading for the DWE – The graduate curriculum committee will review the graded exams and assign a DWE grade of Pass or Fail. The committee suggests a passing grade guideline of ~70% (corresponding to a C letter grade), subject to the committee's evaluation of the relative difficulty of the exam compared to previous years.

Advanced Guidance to students on DWE grading - The committee will provide in advance general guidance to the students on what constitutes a pass/fail.

Retake policy for DWE– Students failing a final are allowed one opportunity to retake the exam in the subsequent year. A student who fails a final twice can appeal the decision to the chair.

(2) The DWE (b) Research paper

The DWE research paper is intended to assess the candidate's readiness to proceed with their PhD research. It also serves as a measure of their writing ability. It will be used as a diagnostic and source for student feedback and guidance. It can be independent from the thesis proposal presentation.

Based on guidance from the student's thesis advisor, the research paper can be completed at a time agreed upon between the student and advisor, but must be completed and submitted to the student's thesis committee at least one week in advance of the thesis proposal presentation.

The exact scope and content of the research paper will be determined by the student's advisor and approved by their thesis committee. The typical research paper should be about 10-20 pages long (length assumes 1" margins, single spaced lines, font size of 12. However, the exact format is up to the student and their advisor). The paper **must include an overview of the primary topic that incorporates a review of the relevant literature** to assess the student's literature review skills.

The research paper guidelines are intentionally broad to provide flexibility for advisors to optimize the paper based on their research program and expectations.

The following list is provided as acceptable suggestions for research paper contents – other options are possible but should be approved by the graduate studies committee:

- published paper (written by student)
- thesis proposal
- research problem
- literature review
- reproduction of literature calculation(s)

In the event that an advisor and student agree to complete the research paper well in advance of the student's thesis proposal presentation (TPP), the student will request that the committee meet to evaluate the research paper and provide feedback to the student.

The possible outcomes for assessment of the research paper are:

- accepted
- accepted with minor revisions requested
- failed

Student failing the assessment will be given an opportunity to revise and resubmit their research paper.

(3) Progress reports

In years without exams (core course finals excluding retakes, DWE research paper, thesis proposal, defense), students must present a progress report to their thesis committee. The report should at minimum consist of a written summary of the student's activities over the past year. The committee will provide feedback to the student and decide whether progress is satisfactory or unsatisfactory. In case of unsatisfactory progress, the student will have to submit a revised progress report within six months of the committee's decision.

(4) Masters track

Students deciding to leave with a Masters degree do not have to finish the DWE research paper, though it can be used as (part of) their Masters thesis.

(5) Pay raise

The committee recommends that the pay increase currently linked to passing the qualifying exam shall be linked to passing the last core course final, i.e. typically at the end of the first year.

(6) Entry level exam

The option of a CM entry level exam, to be taken before or at the beginning of the first year, should be explored. Students passing the entry-level exam would be exempted from taking the CM core course, making room for one elective in the first semester.

IV. Details and discussion on the Doctoral Written Exam structure:

(1) Specifications of Doctoral Written Exam in Graduate School Handbook

The Graduate School Handbook (page 27, Section Heading Examinations), provides guidance on the written examination requirements, including allowed substitutions that meet these requirements. That document links to a second document, titled , "Academic Policy Regarding Approved Substitutes for Master's Degree Comprehensive Exam and Thesis Requirements" which includes the following text:

Examples of approved substitutes are capstone courses, technical reports or independent research projects. Typically, capstone courses can only substitute for comprehensive exams, not for a formal thesis. These capstone courses should synthesize all material studied in the program – not just in a review format but through a set of discussions and assignments where all material from the program is brought together to complete the students' learning

The proposed Doctoral Written Exam in Section I certainly meets these guidelines.

V. Amendment during faculty meeting 12/02/2016:

The proposed changes will go in effect starting academic year 2017-2018, i.e. for the class entering the program in fall 2017.