MPSM/JPSM PhD Qualifying Examination

1. Purpose

Students applying to the PhD program in survey methodology come from a variety of backgrounds. To help assure that all PhD students are equally prepared for candidacy, students must pass both the Qualifying Examination and a Comprehensive Examination in order to advance to candidacy. The purpose of the Qualifying Examination is to test students on their mastery of survey methodology at a level equivalent to that of the successful MS students from MPSM and JPSM.

2. Format

The qualifying examination is an 8-hour, written examination. Examinations are normally administered in the program offices under supervision of faculty or staff of the Program. The examination typically will begin at 9AM and end at 5PM. Students should bring their lunch.

At the discretion of the Director, the examination may be done on departmental laptops (with no Internet connection). The examination is “closed-book;” that is, the student must complete the examination without the assistance of any notes, books, articles, personal contact, or other outside help. The use of calculators is permitted.

Questions on the examination cover material from the courses listed in Section 4 below. Depending on the student’s emphasis, they may be asked to:

a. Provide an integrated summary of the research literature concerning a problem in survey methodology
b. Solve a problem involving properties of statistical estimation
c. Apply statistical procedures to data
d. Propose a research design that will address a specific question in survey methodology
e. Critique approaches or hypotheses to research, based on the research literature
f. Invent, justify, and critique alternative hypotheses about the causes of survey error

An example of the Qualifying Examination specific to each student’s emphasis will be made available to the students.
3. **Schedule**

All PhD students must complete the qualifying exam within twelve months of their entry into the program. The exam will generally be offered the 4th Friday in May, which makes it possible for incoming students to take the exam before they formally begin the PhD program; incoming students must have the permission of the Director in order to take the QE prior to the start of their first term of doctoral studies. In unusual circumstances (e.g., illness or other severe personal emergency), exceptions to this requirement may be granted at the discretion of the Director of the program. Not completing the courses mentioned in Section 4 will NOT be grounds for an exception.

4. **Coverage of the Examination**

For all students, the qualifying examination will cover material from the following courses in the MS curriculum:

- Fundamentals of Data Collection I (SURV 621/SurvMeth 621)
- Fundamentals of Data Collection II (SURV 622/SurvMeth 622)
- Fundamentals of Inference I (SURV 740/SurvMeth 740)
- Fundamentals of Computing and Data Display I (SURV 627/SurvMeth 627)
- Total Survey Quality I (SURV 720/SurvMeth 720)
- A basic sequence in data analysis (e.g., SURV 615-616/SurvMeth 685-686)
- Applications of Statistical Modeling (SURV 617/SurvMeth 687)

For those PhD students working toward a statistical dissertation, the qualifier will also cover the following MS courses:

- Sampling Theory (SURV 440/SurvMeth 617)
- Inference from Complex Surveys (SURV 742/SurvMeth 742)
- Applied Statistics (e.g., Michigan’s Biostatistics 650-651; Maryland’s comparable courses).

For those PhD students working toward a social science dissertation, it will also cover the following MS courses:

- Applied Sampling (SURV 625/SurvMeth 625)
- Analysis of Complex Sample Survey Data (SURV 701/SurvMeth 701)

For those PhD students working toward a data science dissertation, the Qualifier will also focus on material covered in a set of courses or topic areas proposed by the student in consultation with her/his advisor. This approach reflects the flexibility and variability in the MS curriculum for data science emphasis students. The candidacy committee will

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review the proposed set of courses and iterate with the student and her/his advisor if necessary before the exam is set. An example set of topics/courses follows:

- Applied Sampling (SURV 625/SurvMeth 625)
- Analysis of Complex Sample Survey Data (SURV 701/SurvMeth 701)
- Data Mining and Statistical Learning (e.g., Michigan’s STATS 415, SI 671, EECS 445, EECS 545, EECS 598-007, STATS 506, TO 628; Maryland’s comparable courses)

The exam for students in the data science emphasis will cover the main topics in data mining/statistical learning, including: statistical foundations, data visualization, classification, regression, association analysis and clustering. Emphasis will be on statistical learning methodology and the models, intuition, and assumptions behind it, as well as applications to real-world problems.

The students emphasizing social science, statistical science or data science must demonstrate mastery of the material in these courses. As preparation for the examination, students may audit some of these courses or take them for credit. PhD students are strongly encouraged to take the courses for credit if possible, given analyses of past data on QE performance. If students have had equivalent preparation prior to entering the program, taking or auditing the courses may be unnecessary. A student should determine the best approach to preparation in conjunction with his/her advisor.

5. Grading of the Examination

The examination will be written and graded by the members of the Qualifying Examination Committee. The grading of each student’s exam will involve at least two faculty members. Each examination will be given an overall numerical score ranging from 0 to 100. Scores of 75 and above will be deemed passing; those of 59 or below will be deemed unsatisfactory. Those falling between 60 and 74 will be deemed conditionally passed. In order to be able to take the Comprehensive Exam, students must pass the Qualifying Exam unconditionally or satisfy all conditions established by the Candidacy Committee.

Passing is a grade assigned to completed examinations that demonstrate mastery of the tested material at a level commensurate to that of a high-performing MS student.

A conditional pass indicates that the student has demonstrated mastery of a portion of the tested material but not all. After deliberation of the Candidacy Committee and in consultation with the Director and Associate Director of the student’s program, the student will be given a specific set of tasks to perform (conditions), as a way of demonstrating mastery of the relevant areas. Upon fulfilling the conditions, the student will be re-evaluated by the Candidacy Committee to make a final pass/fail decision. If these tasks are performed to the satisfaction of the Committee, the student will be considered to have passed the qualifier. The students failing to meet the conditions will not be permitted to continue in the Ph.D. program.
An unsatisfactory grade means that the student has failed to demonstrate sufficient mastery of the research literature and practices of the field to permit continuation in the PhD program. Normally, students would not pursue the PhD further, given this grade. Students may petition the faculty to retake the examination at the next sitting. This will require a vote of the full Faculty. The vote will be the final decision of the Program. Students will be given only one additional chance to pass the qualifier; a grade of unconditional pass must be obtained on the second try.