PSC 404
Probability and Inference

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PURPOSE
This course in mathematical statistics provides graduate students in Political Science with a solid foundation in probability and statistical inference. The focus of the course is on the empirical modeling of non-experimental data. While substantive political science will never be far from our minds, our primary goal is to acquire the tools necessary for success in the rest of the econometrics sequence. As such, this course serves as a prerequisite for the advanced Political Science graduate courses in statistical methods (PSC 405, 505, and 506).

PREREQUISITES
The math “boot camp” is the only course prerequisite, as familiarity with calculus is necessary to understand the material. Students who remain uncomfortable with differentiation and integration may want to consider sitting in on a calculus course offered elsewhere in the University.

COURSE REQUIREMENTS
Evaluation is based on homework assignments (10%), a midterm exam (40%), and a final exam (50%). In addition to office hours, the teaching assistant will hold a weekly recitation. Attendance is mandatory. The purpose of the recitation is to cover material not covered in lecture, to go over homework problems, and to review for exams. Students are responsible for material covered in lecture, recitation, and the required readings. A web page for this course is to be found at http://www.rochester.edu/College/PSC/clarke/404/404.html.

TEXT
The required texts for this course are:

COURSE SCHEDULE

Topic 1: Course Overview and Introduction to Empirical Modeling


Topic 2: Probability


Reading: DS Ch. 1 and 2

Topic 3: Random Variables and Distributions

Specifics: Random variables. PDFs and CDFs. Functions of random variables.

Reading: DS Ch. 3

Topic 4: Expectation


Reading: DS Ch. 4

Topic 5: Special Distributions

Specifics: Named distributions. Central limit theorem.

Reading: DS Ch. 5

Midterm. Covers topics 1-5.
Topic 6: Estimation


Reading: DS Ch. 6

Topic 7: Sampling Distributions of Estimators


Reading: DS Ch. 7

Topic 8: Testing Hypotheses


Reading: DS Ch. 8

Topic 9: Categorical Data and Nonparametric Methods

Specifics: $\chi^2$ tests. Simpson's paradox. Sign and rank tests.

Reading: DS Ch. 9

Topic 10: Simulation

Specifics: MCMC.

Reading: DS Ch. 11

Final Exam. Cumulative with weight on second half.