

Syllabus for Graduate Prob-Stats
Fall Semester, 2018, Unique #34540
Maxwell B. Stinchcombe

Organization: We will meet Mondays and Wednesdays, 2:00-3:30 p.m. in BRB 1.118.

Contact info:

- Stinchcombe: e-mail, max.stinchcombe@gmail.com; office, BRB 2.102A; phone, 512-475-8515.
- TA's: tbd.

Office hours: Stinchcombe, Tuesdays 2-5 p.m. and by appointment; TA, tbd.

Required Textbooks: The books we will use are C&B

G. Casella and R. L. Berger. *Statistical Inference*. The Wadsworth & Brooks/Cole Statistics/Probability Series. Wadsworth & Brooks/Cole Advanced Books & Software, Pacific Grove, CA, second edition, 2002.

and HB

H. J. Bierens. *Topics in Advanced Econometrics*. Cambridge University Press, Cambridge, 1994. Estimation, testing, and specification of cross-section and time series models.

We will frequently take from CSZ, in the textbook for Math for Economists,

D. Corbae, M. B. Stinchcombe, and J. Zeman. *An Introduction to Mathematical Analysis for Economic Theory and Econometrics*. Princeton University Press, Princeton, NJ, 2009.

Articles: I will circulate, via e-mail, a number of articles.

Expectations: You will get much more out of lectures if you read the material and assigned problems ahead of time, I expect you to try to do this. If you do not read the material before the class times, you will suffer needlessly. I will cover parts, not all, of the material in the readings from a different perspective and with different emphases. If you do not read the material either before or after the corresponding lectures, you are likely to fail the course unless you have a very good prob-stats background already.

I also expect you to ask if you don't know what I'm talking about in lecture. Think of your level of understanding as a random sample from the class understanding, and then act in the interests of yourself and the class. More generally, I expect you to take an activist attitude toward your education, to figure out when you do and do not understand a topic, and to take the appropriate steps to remedy any lacks. Often the appropriate first step is to ask for advice.

Background: I will assume that you have had a good undergraduate prob-stats course, that is, one giving you a basic competence with random variables, their means, medians, variances, probability density functions (pdf's), cumulative distribution functions (cdf's), as well as the weak and strong law of large numbers and the Gaussian part of the central

limit theorem. I will also assume a good working knowledge of differential and integral calculus in several variables.

Topics Overview: This course will a good bit of the probability and statistics that you need for graduate economics. As a result, it will spend more time on decision theory and non-random samples than is usual for prob-stats courses catering to more general audiences. We will regularly use examples from micro- and macro-economics. The following is a brief outline.

- Why we're doing all of this. A set of examples of economics problems involving probabilistic reasoning.
- Measure theoretic probability. This is the formal underpinning of everything currently done in economics. It is still possible to do research without knowing this material, and many researchers only know this "in the back of their minds." It is nearly impossible to read current methodological research without it.
- Conditional expectations. After you see new information, how does it change what you believe? This is about the formal answer to that question that underlies almost everything that is currently done in economics.
- Distributions and estimators. This material is more classical, you should have seen much of it your under-graduate prob-stats course.
- Non-random samples. This is the beginning of the study of the situation that faces the majority of samples of interest in current economics research.

Evaluation: There will be 4 homework assignments, each work 12% of your total grade, a mid-term worth another 12%, and a final work 40%.

- As needed, I encourage you to work together on the homeworks, and to consult with me and the TA.
- It may be tempting to free ride on the work of others. More bluntly, you may feel pressure to copy the answers. I strongly recommend against this. The two exams will consist mostly of variants of the homework problems. I understand the word "variant" in a wide sense. This means that if you do not know how to solve the problems or do not know the logic behind the solution strategy, then you will not be prepared to give a satisfactory performance on the exams.
- The homeworks and the exams will be designed to test your understanding on three levels. First and most basically, do you understand the meanings of the terms and concepts used? Second, can you use the concepts to solve well-specified problems? And third, can you see parallels between different situations that allow you to generalize from well-specified problems to new situations? This last is the most important, and it builds on the previous two.

Assignments and Exams: To make my work and the work of the TAs easier, please hand in legible solutions at the due date. It may be useful to you to also keep an electronic copy for yourself. I do not accept late assignments. If you must miss the mid-term exam for university business, you must arrange this with me well in advance, and we will shift the mid-term credit equally to the homeworks and final exam. If you miss the final exam without a medical excuse, you will fail the course. For medical excuses, we will follow university policies and procedures.