Prof. William H. Sandholm
Department of Economics
University of Wisconsin
Fall 2017

Syllabus - Economics 704, Part 1

Course Description

Economics 704 is the first half of the first-year Masters' econometrics sequence. I teach the first half of the course (probability and statistics) and Jack Porter teaches the second (regression and instrumental variables).

Reading Materials

The textbook for this class is

William H. Sandholm and Brett Saraniti (2017). *Vital Statistics*: *Probability and Statistics for Economics and Business*. Preliminary edition. Oxford.

It is available at the University Bookstore. Two more advanced references are

Patrick Billingsley (1995). *Probability and Measure*, third edition. Wiley.

George Casella and Roger L. Berger (2002). *Statistical Inference*, second edition. Duxbury/Thomson.

Billingsley is an exceptionally well-written introduction to measure theory and measure-theoretic probability. Casella and Berger is an excellent Ph.D.-level introduction to statistics.

Readings and Problem Sets

The class is divided into six units. The topics to be covered, readings, and problem sets for each unit are listed on the next two pages. The chart on the last page shows which lectures correspond to which units. All but the last problem set will be turned in for credit, and the due dates for the problem sets are listed on the chart on the last page. Problem sets can be turned in one lecture late for half-credit. The last problem set will require you to use Microsoft Excel workbooks for some problems.

Exam and grading

The exam will take place on Wednesday, October 25 in the evening. Problem sets will count for 20% and the exam for 80% of your score for the first half of the course.

Contact information

The Economics 704 website is

http://www.ssc.wisc.edu/~whs/teaching/704

My office is 7436 Social Science. You can reach me by e-mail at whs@ssc.wisc.edu or by phone at 263–3858. My office hours are on Tuesdays and Thursdays from 2:45 to 3:45 and by appointment.

TA Information

Our TAs for this class are Emilio Cuilty and Jian Zhang.

Emilio Cuilty
Sec. 302 (Fr 12:05-12:55, 6240 SS)
Sec. 304 (Fr 1:20-2:10, 4308 SS)
office hours: Th 9:00-11:00
office: 7143 SS
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Jian Zhang
Sec. 301 (Fr 11:00-11:50, B113 Van Vleck)
Sec. 303 (Fr 8:50-9:40, 6232 SS)
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Course Outline

Unit 1: (3 lectures)

Readings: Ch. 2: Probability models
Ch. 3: Random variables
Ch. 4: Multiple random variables (Sec. 4.4 optional)
Ch. 5: Bernoulli trials processes and discrete distributions

Problem set: 1: 2.2.8; 2: 2.3.1; 3: 2.3.6; 4: 2.4.4; 5: 2.4.8; 6: 2.5.2, 7: 2.5.6; 8: 2.5.9; 9: 2.M.4; 10: 2.M.6; 11: 3.1.5; 12: 3.2.5; 13: 3.3.4; 14: 3.4.4; 15: 3.4.11; 16: 3.M.3; 17: 4.1.3; 18: 4.1.4; 19: 4.1.5; 20: 4.2.1; 21: 4.2.7; 22: 4.3.1; 23: 4.3.5; 24: 4.M.2; 25: 4.M.3; 26: 5.2.6; 27: 5.4.3; 28: 5.4.5; 29: 5.M.1; 30: 5.M.3

Unit 2: (2 lectures)

Ch. 6: Continuous random variables and distributions
Online appendix to Ch. 6

Problem set: 1: 6.2.4; 2: 6.2.5; 3: 6.3.6; 4: 6.5.3; 5: 6.5.6; 6: 6.6.1; 7: 6.6.5; 8: 6.6.9; 9: 6.A.2; 10: 6.A.3; 11: 6.B.1; 12: 6.B.2; 13: 6.B.3; 14: 6.B.4; 15: 6.B.5; 16: 6.B.6

Unit 3: (3 lectures)

Readings: Ch. 7: The central limit theorem
Online appendix to Ch. 7
Ch. B: The strong law of large numbers

Problem set: 1: 7.3.2; 2: 7.3.3; 3: 7.3.4; 4: 7.4.1; 5: 7.4.2; 6: 7.4.3; 7: 7.6.2; 8: 7.6.4; 10: 7.6.5; 11: 7.A.1; 12: B.C.1; 13: B.C.4; 14: B.C.5; 15: B.C.8

Unit 4: (1.5 lectures)

Readings: Ch. 12: Descriptive statistics (can be skimmed)
Ch. 13: Probability models for statistical inference
Ch. 14: Point estimation

Problem set: 1:. 13.C.1; 2: 13.C.5; 3: 13.C.6; 4: 13.C.7; 5: 13.C.13; 6: 14.1.1; 7: 14.1.4; 8: 14.2.2; 9: 14.2.4; 10: 14.2.6; 11: 14.3.1; 12: 14.3.3; 13: 14.3.6; 14: 14.4.1; 15: 14.4.3; 16: 14.4.5 17: 14.M.2; 18: 14.M.4

Unit 5: (2 lectures)

Reading: Ch. 15: Interval estimation and confidence intervals

Problem set: 1: 15.2.1; 2: 15.2.2; 3: 15.2.7; 4: 15.2.9; 5: 15.3.1; 6: 15.3.2; 7: 15.4.2; 8: 15.4.5; 9: 15.4.6; 10: 15.4.7; 11: 15.5.4; 12: 15.5.5; 13: 15.6.3; 14: 15.M.1

Unit 6: (2.5 lectures)

Reading: Ch. 16: Hypothesis testing

Problem set: 1: 16.3.1; 2: 16.3.2; 3: 16.3.5; 4: 16.3.6; 5: 16.3.11; 6: 16.4.4; 7: 16.4.8; 8: 16.5.1; 9: 16.5.2; 10: 16.5.3; 11: 16.6.1; 12: 16.6.2; 13: 16.6.3; 14: 16.7.2; 15: 16.7.3; 16: 16.7.6; 17: 16.7.7; 18: 16.7.9; 19: 16.7.10; 20: 16.M.3

Course Schedule

Monday	Wednesday
	Sept. 6: Unit 1
Sept. 11: Unit 1	Sept. 13: Unit 1
Sept. 18: Unit 2 Problem set 1 due	Sept. 20: Unit 2
Sept. 25: Unit 3 Problem set 2 due	Sept. 27: Unit 3
Oct. 2: Unit 3	Oct. 4: Unit 4 Problem set 3 due
Oct. 9: Units 4–5	Oct. 11: Unit 5 Problem set 4 due
Oct. 16: Units 5–6	Oct. 18: Unit 6 Problem set 5 due
Oct. 23: Unit 6	Oct. 25: no lecture evening exam

Exam: Wednesday, October 25, evening.