

**Economics 522A: Econometrics**  
**Spring Semester 2007**  
**Course Syllabus**

Lectures: Tues/Thurs 9:30-10:45 am, McClelland 401KK

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**Course Description:** This is the second course in the core sequence in quantitative methods for the PhD in economics. Building upon the material in Econ 520, this course introduces the econometric analysis of conditional models, focusing on the use of least squares and related methods for estimating conditional expectations, and on linear instrumental variables methods for estimating linear causal relationships.

**Prerequisites:** You are expected to have taken Economics 519 and 520.

**Textbooks:**

- Casella, G., and Berger, R.L., *Statistical Inference*, 2nd edition, Duxbury Press.
- Ruud, P., *An Introduction to Classical Econometric Theory*, Oxford University Press.

We will start with some material in Casella and Berger that we did not have time to cover in 520 – hypothesis testing and confidence intervals.

Then we will move on to the core content of the course – regression modeling and methods for estimating linear causal relationships. The Ruud book will be our main reference, but we will not be following the book as closely as we did Casella and Berger. I will provide written lecture notes for all the lectures.

You may find it useful to consult other textbooks as you learn this material. In addition to the textbooks suggested for 520, the following graduate econometrics texts may be useful:

- Goldberger, A., *A Course in Econometrics*, Harvard University Press.
- Greene, W. H., *Econometric Analysis*, Prentice Hall.
- Hayashi, F., *Econometrics*, Princeton University Press.

**Assessment:**

- Homework Assignments **10%**: There will be homework assignments nearly every week. They are intended primarily to help you prepare for the exams, and will be graded on a pass/no pass

basis. Because of the frequency of the assignments, **I will not accept late homeworks for any reason.** However, I will drop the lowest homework score when calculating your overall grade in the course. You are allowed to work in groups on the homework, but you must write up your own solutions in your own words.

- Midterm Exam **40%**: The (in-class) midterm is tentatively scheduled for Thursday, March 8. We will finalize the date of the midterm during the first week of classes.
- Final Exam **50%**: The final exam will be cumulative.

**Computer Software:** The homework assignments will be a mix of pen-and-paper problems and computational and data analysis problems. For the latter, we will use Matlab/Octave.

**Course Web Site:** <http://www.u.arizona.edu/~hirano/522A.html>

I will post lecture notes, homework assignments, and other supplementary material for the course here.

**Econ 520/522A Wiki:** <http://wiki.econ.arizona.edu/ECON520/>

**Outline:** (may be revised as semester progresses)

1. Statistical Inference (continuation of 520)
  - (a) Hypothesis Testing (CB 8.1, 8.3.1-8.3.2)
  - (b) Most Powerful Tests (CB 8.3.2-8.3.3)
  - (c) Large Sample Tests (CB 10.3)
  - (d) Confidence Intervals (CB 9.1-9.2, 10.4)
2. Regression Modeling
  - (a) Introduction: Modeling multivariate relationships (Ruud 1)
  - (b) Multivariate and Conditional Normal Model
    - i. MVN distribution: Ruud 10.5.1
    - ii. MLE for MVN model: notes
    - iii. MLE for conditional normal model: notes
  - (c) Neoclassical Linear Regression Model (Ruud 6.1-6.2, 7.1-7.4)
  - (d) The least squares estimator:
    - i. Unbiasedness: Ruud 6.2
    - ii. Variance/covariance: Ruud 8
  - (e) Interlude: some geometry for least squares (Ruud 2-3)
  - (f) The Least Squares estimator: Gauss-Markov theorem (Ruud 9)
  - (g) LS: normal distribution theory (Ruud 10, 11)
  - (h) LS: distribution theory without normality (Ruud 13, notes)
  - (i) Heteroskedasticity (Ruud 18)
  - (j) Serial Correlation (Ruud 19)
3. Causal Modeling
  - (a) Interlude: from correlation to causation (notes)
  - (b) Linear instrumental variables (Ruud 20)
  - (c) Simultaneous equations models (Ruud 26)
  - (d) Introduction to GMM estimation (Ruud 21,22)