Course Outline

Course Introduction & probability (January 7 - 11)

- What sorts of social science questions are amenable to quantitative investigation?
- How do we make causal arguments?
- What is a distribution and how does it relate to answering these questions (Stock and Watson, 2011, chapters 1 & 2)?

These lectures will also cover types of data available for investigation and some data summary techniques. Agresti and Finlay (2007, sections 2.1 - 2.3 & 3.1 - 3.4) provides some additional information about sampling, variable measurement and data description. The files will be posted online early in the first week of class.

Probability, continued (January 14 - 18)

- What is the Normal Distribution?
- The Chi-Squared Distribution?
- The Student t and the F Distribution?
- How is random sampling important?
- What can be done without a random sample?
- Finally, what is the Central Limit Theorem?

Supplemental readings will also be posted online this week (Agresti and Finlay, 2007, sections 4.1 - 4.6).

Estimation and Hypothesis Tests (January 23 - 25)

- How do we make inferences about the population?
- What is the form of a hypothesis test or a confidence interval for that estimate?
- How do we compare different populations?
- Which distributions are we using in these comparisons?
- And what does it mean to say that data is correlated (Stock and Watson, 2011, chapter 3)?

Simple Linear Regression (January 28 - February 1)

- What is the linear regression model?
- How do we interpret the coefficients and measures of fit?
- What assumptions are necessary to fit a least squares model (Stock and Watson, 2011, chapter four)?

Linear Regression and Inference (February 4 - 8)

- How do hypothesis tests and confidence intervals work for a simple linear regression model?
- How do we interpret binary predictors?
- What is heteroskedasticity and why is it important?
- What is the GaussMarkov Theorem(Stock and Watson, 2011, chapter five)?

These lectures will also cover small sample-size prediction and some graphical presentation of models.

Multiple Regression (February 11 - 15)

- What can bias our model?
- Why is it important (typically) to have multiple regressors?
- What additional assumptions are we making?
- And what possible problems are likely to crop up in this type of model (Stock and Watson, 2011, chapter six)?

Multiple Regression and Inference (February 19 - 22)

- How do hypothesis tests and confidence intervals work in a multiple regression context?
- How do we test joint hypotheses?
- These lectures will also begin taking up the vital topic of model specification: how do we select variables to include in the model (Stock and Watson, 2011, chapter seven)?

Midterm Examination (February 23 - March 1)

There will be both a portion in the testing center (available on February XXXX) and a portion that is to be done out of class over approximately this period. The final copy of the take-home portion will be due on Friday, March 1 at 6:00 p.m., under Prof. Pope's door.

Nonlinear Models (March 4 - 8)

- What about nonlinear relationships?
- What about situations where regressors interact (Stock and Watson, 2011, chapter eight)?

Internal and External Validity (March 11 – 15)

- How do we assess internal and external validity?
- Can we deal with those threats?
- How do we adjust our interpretations accordingly (Stock and Watson, 2011, chapter nine)?

Panel Data (March 18 - 22)

- What is "panel data" and why is it important?
- What are fixed effects?
- Finally, what specific assumptions are necessary to make inferences from this type of model (Stock and Watson, 2011, chapter ten)?

Binary Dependent Variables (March 25 - 29)

- What do we do with binary data?
- What is a probit model and how does it work (Stock and Watson, 2011, chapter eleven)?

Review and Introduction to Advanced Topics (April 1 - 5)

- How can regressions be used to analyze experiments?
- Can it say something more concrete about causality (Stock and Watson, 2011, chapters twelve and thirteen)?