

**Department of Economics  
Northeastern University**

**Econ 5140  
Applied Econometrics  
Spring 2018**

**Location:** Snell 117  
**Time:** Wednesdays 4:35-7:45  
**Office Hours:** TBD

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**Office Hours:** TBD

**Course Description**

This course provides an intensive study of econometric techniques applied to cross-section, time-series, and panel data. The fundamentals of econometrics are applied to analyzing structural economic models, forecasting, and policy analysis. Computer applications and an empirical research project are an integral part of the course. Prerequisites: ECON 5105 and graduate standing.

4 Credit Hours  
4 Lecture Hours

**Textbook**

Stock, J. H., & Watson, Mark W. (2015). *Introduction to Econometrics* (3<sup>rd</sup> edition update). Boston: Pearson Education, Addison Wesley. ISBN 978-0-13-348687-2. Note: this is the updated third edition. If you can't get this, then get the third edition (2011). It will do although the differences may be annoying.

## **Requirements**

There will be several problem sets, and an empirical research paper using one of the estimation techniques covered in the course.

## **Grade**

The grade will be based 70% on the problem sets, and 30% on the empirical research paper.

## **Policy on Academic Honesty**

Warning: The Economics Department takes very seriously the issue of academic honesty. Any student who cheats on an exam or in the preparation and writing of a course assignment will at minimum fail the course and will be put on academic probation. Individual faculty, with the support of the Department, can impose harsher penalties as they deem necessary.

Cheating includes plagiarism, which is broadly defined as taking ideas, concepts, or actual words of another person and passing them off as your own work.

## **Course Outline and Required Reading**

### **A. Introduction, Probability and Statistics Review**

1. Before our first class meeting.  
Chapter 1. Economic Questions and Data.  
Chapter 2. Review of Probability.  
Chapter 3. Review of Statistics.

### **B. The OLS Model and Specification Issues**

2. January 10. Bivariate Regression  
Chapter 4. Linear Regression with One Regressor.  
Chapter 5. Regression with a Single Regressor: Hypothesis Tests and Confidence Intervals.
3. January 17. Multivariate Regression  
Chapter 6. Linear Regression with Multiple Regressors.  
Chapter 7. Hypothesis Tests and Confidence Intervals in Multiple Regression.

4. January 24. Nonlinear Specifications 1  
Chapter 8, Nonlinear Regression Functions, Sections 1 and 2.  
8.1. A General Strategy for Modeling Nonlinear Regression Functions.  
8.2. Nonlinear Functions of a Single Independent Variable.
5. January 31. Nonlinear Specifications 2  
Chapter 8, Nonlinear Regression Functions, Sections 3 through 5.  
8.3. Interactions Between Independent Variables.  
8.4. Nonlinear Effects on Test Scores of the Student-Teacher Ratio.  
8.5 Conclusion.

### **C. Regression Methods for Assessing Causal Relationships**

6. February 7. Why Additional Methods are Needed  
Chapter 9. Assessing Studies Based on Multiple Regression.
7. February 14. Time Series/Cross Section Models  
Chapter 10. Regression with Panel Data.
8. February 21. Probit and Logit  
Chapter 11. Regression with a Binary Dependent Variable.
9. February 28. Instrumental Variables Models  
Chapter 12. Instrumental Variables Regression.
10. March 14. Design Considerations  
Chapter 13. Experiments and Quasi-Experiments

### **D. Time Series Analysis and Forecasting**

11. March 21. Introduction and the Autoregressive Distributed Lag Model  
Chapter 14, Introduction to Time Series Regression and Forecasting, Sections 1 through 5.  
14.1. Using Regression Models for Forecasting.  
14.2. Introduction to Time Series Data and Serial Correlation.  
14.3. Autoregressions.  
14.4. Time Series Regression with Additional Predictors and the Autoregressive Distributed Lag Model.  
14.5. Lag Length Selection Using Information Criteria.
12. March 28. Nonstationarity  
Chapter 14, Introduction to Time Series Regression and Forecasting, Sections 6 through 8.  
14.6. Nonstationarity I: Trends.  
14.7. Nonstationarity II: Breaks.  
14.8. Conclusion.

13. April 4. Assessing Dynamic Causal Effects  
Chapter 15. Estimation of Dynamic Causal Effects
14. April 11. The Vector Autoregressive (VAR) Model  
Chapter 16. Additional Topics in Time Series Regression, Sections 1 and 2.  
16.1. Vector Autoregressions.  
16.2. Multiperiod Forecasts.
15. April 18. Cointegration and the Vector Error Correction (VEC) Model  
Chapter 16. Additional Topics in Time Series Regression, Sections 3 and 4.  
16.3. Orders of Integration and the DF-GLS Unit Root Test  
16.4. Cointegration