Course Description
Quantitative Methods II is the second course in the three-course quantitative sequence at GPPI. This course builds on the material covered in Quantitative Methods I to further develop an understanding of the motivation and applications of multivariate linear regression, with a particular emphasis on applying the tools to analyze public policy problems and knowing how to interpret the results. By the end of the semester you should be able to: (1) conceptually understand the econometric and statistical methods that are covered in the course and know how they can be applied to analyze a variety of public policy issues; (2) interpret the results of multivariate linear regressions and think critically about the potential problems that arise when trying to draw conclusions from such results; (3) use a statistical package (SAS) to conduct basic statistical analyses.

Texts and Materials
Required:

Recommended:

Other materials:
Articles, notes, and other materials will be handed out in class. Data for the problem sets will be provided, or instructions for obtaining the data will be given. A hand-held calculator will be helpful. Finally, students may want to purchase a copy of SAS for their home computers for $25 from Hoya Computing (room B-36 in St. Mary’s Hall), Tel: (202) 687-0640. ([http://www.georgetown.edu/uis/hoya/library.html](http://www.georgetown.edu/uis/hoya/library.html)).

Course Requirements and Grading
Course grades will be based on the following:
- Class participation and effort: 5%
- Final project: 10%
- Biweekly problem sets (six total): 25%
- Midterm exam (Thursday, March 6): 30%
- Final exam (Monday, May 5): 30%
Biweekly problem sets will be handed out on Tuesdays and will be due two weeks later at the beginning of class. Students are strongly encouraged to work on these problem sets in study groups. However, each student must prepare and submit his or her own write-up for each problem set (including SAS programs and output when appropriate).

**COURSE OUTLINE FOR WEEK OF:**

January 7: **Review from Quant I**  
*skim Wooldridge Appendices A through C*

January 14: **Simple Regression**  
*Healey chapter 15, Wooldridge chapters 1 and 2; Kennedy sections 4.1 and 4.2*  
Derivation of the simple OLS model; assumptions and properties of OLS; $R^2$; units of measurement of dependent and independent variables

January 21: **Simple Regression (continued)**  
*Healey chapter 15, Wooldridge chapter 2; Kennedy sections 4.1 and 4.2*  
Transformations of dependent and independent variables (including logarithm models); hypothesis testing of regression coefficients

January 28: **Multiple Regression Basics I**  
*Wooldridge chapter 3, pp. 68-89; 103-105*  
Mechanics and interpretation of OLS with multiple explanatory variables; statistical properties and assumptions of OLS; Gauss-Markov theorem

February 4: **Multiple Regression Basics II**  
*Wooldridge chapter 3, pp. 89-105; Kennedy sections 6.1 and 6.2, and chapter 11*  
Statistical properties and assumptions of OLS; Inclusion of irrelevant variables, omitted variables, multicollinearity; Gauss-Markov theorem

February 11: **Multiple Regression Basics III**  
*Wooldridge chapter 3, pp. 89-105; Kennedy sections 6.1 and 6.2, and chapter 11; and section 3.3*  
Inclusion of irrelevant variables, omitted variables, multicollinearity, Gauss-Markov theorem

February 18: **Inference I**  
*Wooldridge chapter 4, pp. 116-139; Kennedy sections 4.1 and 4.2*  
Hypothesis tests for single parameters

February 25: **Inference II**  
*Wooldridge chapter 4, pp. 139-157; Kennedy sections 4.3*  
Hypothesis tests for linear combination of parameters; F-test of multiple linear restrictions; reporting regression results
March 4: Midterm Exam Review

    MIDTERM EXAM: Thursday, March 6 (in class)

March 11: Spring Break

March 18: Selection and Specification of Explanatory Variables
    Wooldridge chapter 6
    Data scaling, functional form, quadratics, interactions, adjusted $R^2$, overcontrolling

March 25: Binary / Indicator / “Dummy” Variables
    Wooldridge chapter 7; Kennedy chapter 14
    Independent indicator variables; interactions; Chow tests; dependent indicator variables (linear probability models)

April 1: Binary / Indicator / “Dummy” Variables
    Wooldridge chapter 7; Kennedy chapter 14
    Explanatory indicator variables; Chow tests; dependent variables measured as indicators—linear probability models

April 8: Heteroskedasticity; Data Problems I
    Wooldridge chapter 8; Kennedy sections 8.1, 8.2, and 8.3; Wooldridge chapter 9, pp. 289-302; Kennedy chapter 5 and section 6.3
    Consequences of, tests for, and fixes for violations of homoskedasticity; Functional form misspecification, proxy variables

April 15: Data Problems II
    Wooldridge chapter 9, pp. 295-309; Kennedy chapter 5 and section 6.3
    Proxy variables; measurement error

    NOTE: No class Thursday, April 17 (GU Easter Break)

April 29: Data Problems III
    Wooldridge chapter 9, pp. 302-317
    Measurement error, missing data, nonrandom samples, outliers

    FINAL EXAM: Monday, May 5, 4:00 – 6:00 p.m.