

# MSc Course Outline

## Econometrics - EC5040

**Course Leader - Jonathan Wadsworth**

**Autumn Term - 20 credits**

**Version - 2.0**

### **AIMS**

This is a course intended to familiarise students with the principal methods of econometric analysis. The emphasis is on applied econometrics and will try to ensure that you are comfortable when reading and evaluating the econometric work of others and that you can also produce good quality applied econometric work of your own.

The first half of the course is designed to ensure a sound understanding of the basics, assuming that you have already completed a core undergraduate course in econometrics. You will be introduced to the principles and assumptions underlying ordinary least squares. The second half of the term will then study the consequences of any departure from these assumptions, how to test for this and what to do about it.

### **LEARNING OUTCOMES**

On completion of the Autumn Term students should:

- be able to formulate, estimate, test and interpret suitable models for the empirical study of economic events;
- have acquired the ability to evaluate the performance of alternative econometric models through the appropriate use of tests.
- Be able to demonstrate an ability to apply regression techniques through the use of econometric software.
- Feel confident about reading and interpreting applied economic articles in journals.

### **COURSE DELIVERY**

The course will be delivered through one 2-hour lecture and two 1-hour seminars each week. One seminar will be delivered by the course leader and one by a PhD student. The lectures will develop the main econometric tools and theoretical arguments and the seminars will discuss problem sets.

There will be a weekly problem set that comprises both theoretical and computer based applied econometric problems. Classes will be devoted to the study of problem sets. Students should try to attempt selected problems before their

solutions are discussed in class. In order to have any realistic hope of doing well in the examinations, students should attempt to go over these problem sets every week. (Answers will be given out with a lag).

Knowledge of basic undergraduate econometrics is assumed, as is elementary knowledge of calculus, statistics and matrix algebra.

## ASSESSMENT

Formative assessment:

- Homework questions will be discussed in weekly seminars

Summative assessment:

- Exam (75% of final mark) 2 hour unseen written examination, taken in the summer term. The final exam will comprise 1 compulsory question and a choice of any 1 from 2 subsequent questions.
- One 1-hour mid-term test taken after reading week (15% of final mark)
- One computer based assessed test (5% of final mark) to be handed in after the end of term (it is in addition to the regular computer based problems in the problem sets)
- One problem set (5% of final mark) selected by the course leader from a series of homeworks.

Dates of tests and coursework hand-in deadlines can be found in the student handbook and on the website.

## READING

The course will not follow any textbook slavishly, but the book that comes closest and so acts as the principle course text is:

Greene, William, *Econometric Analysis*, 7<sup>th</sup> Edition, Prentice Hall, (G)  
**(Library code: 330.01 GRE)**

This book deals with many more topics than can be covered in 10 weeks and so will act as a useful econometric reference in your subsequent careers (and is also useful for the econometrics courses you will take in the Spring term)

You will also be given a set of abbreviated lecture notes each week which you will be expected to expand and complement with relevant readings from a range of graduate texts available. The best of the rest currently available are:

Johnston, Jack and John DiNardo, *Econometric Methods*, 4<sup>th</sup> Edition, McGraw-Hill, (JD) **(Library code: 330.0182 JOH)**

Wooldridge, J., *Econometric Analysis of Cross Section and Panel Data*, MIT Press. **(Library code: 330.01 WOO)**

Cameron, C. and P. Trivedi, *Microeconometrics*, Cambridge University Press, **(Library code: 330.01 CAM)**

Davidson, R. and MacKinnon, J., *Econometric Theory and Methods*, Oxford University Press, **(Library code: 330.01 DAV)**

Two other good books which contain plenty of empirical examples and which provide lots of worthwhile underlying intuition, (though pitched below the level of this course), are:

G. Maddala, *An Introduction to Econometrics*, 3<sup>rd</sup> Edition, John Wiley

J. Wooldridge, *Introductory Econometrics*, South Western College Press, **(Library code: 330.01 WOO)**

There are also two editions of the *Journal of Economic Perspectives*, Fall 2001 and Spring 2010, which are given over to a discussion of several practical econometric issues and deals with them in a non-technical way.

## **WEEKLY TIMETABLE**

### **Week 1. Ordinary Least Squares**

Learning Objectives: By the end of this week you should be familiar with: Matrix formulation of the regression model; the derivation of OLS estimates; algebra of least squares

Reading: G ch. 3.1-3.2, JD ch. 3.1-3.3; W. Ch. 1, 2. CT ch. 4, DM ch. 1, 2

### **Weeks 2 & 3. Gauss Markov Theorem and Properties of OLS Estimators**

Learning Objectives: By the end of this week you should be familiar with: Properties of least squares estimates;

Reading: JD ch. 3.4, 4; G ch. 3.3-3.6, DM ch. 3

### **Weeks 4 & 5. Hypothesis Testing**

Learning Objectives: By the end of this week you should be familiar with: test statistics for model evaluation; Prediction using OLS; statistical properties of estimates

Reading: G ch. 5, JD ch. 3,5; DM ch. 4

### **Week 6. Heteroskedasticity**

Learning Objectives: By the end of this week you should be familiar with: Non-constant variance in residuals. Tests for presence. What to do about it. Feasible GLS

Reading: G ch. 9 JD ch. 6.2-6.3;

### **Weeks 7 & 8. Measurement Error and Endogeneity**

Learning Objectives: By the end of this week you should be familiar with: Causes and consequences of endogeneity Testing for it. What to do about it. Consequences of badly measured right and left hand side variables Endogeneity caused by interdependence between left and right hand side variables. Instruments and Identification.

Reading: G ch. 8, JD ch. 5.5, 9.4; 16; Wooldridge Ch. 5, 6, 8 & 9.; CT ch. 6; JEP pp. 57-67

### **Week 9. Two Stage Least Squares Estimation**

Learning Objectives: By the end of this week you should be familiar with the two stage least squares as a solution to the problem of endogeneity.

Reading: JD ch. 5.6, 9.5; G ch. 8; Wooldridge Ch. 5, 6, 8 & 9. CT ch. 4.8, 4.9; JEP pp. 57-67, DM ch. 8

### **Week 10. Combining Cross-Section and Time Series Data (Panel Data)**

Learning Objectives: By the end of this week you should be familiar with: How to estimate when there are repeated observations on the same agents over time. Fixed v random effects; Hausman test

Reading: G ch. 11, JD ch. 12; Wooldridge Ch. 10