Faculty of Commerce and Economics
School of Economics

ECON3203
ECONOMETRIC THEORY

COURSE OUTLINE
SESSION 2, 2005
1. COURSE STAFF
Lecturer: Dr. Rachida Ouysse
Office: Room 106, John Good Sell Building
Consultation Times: Wednesday 2pm-5pm
Email: rouysse@unsw.edu.au
Phone: 9385-3321

1.1 Communication with Staff
In addition to office hours, students can send course specific inquiries by email or by phone.

2. INFORMATION ABOUT THE COURSE

2.1 Teaching times and Locations
There are three scheduled teaching hours per week in a single block from 9am to 12noon on Thursdays. The available period will be divided into two hours lecture time and one-hour tutorial time. There will be a 15 minutes break in between.

Location: Quadrangle building, Room Quad GO34

2.2 Units of Credit
UOC value for the course: 6 units of credits.

2.3 Relationship of this course to other course offerings

The subject matter of Econometric Theory will examine techniques of estimation and inference in econometric models that refine and extend the linear regression model. After a brief review of the linear regression model, asymptotic, or large sample, theory will be developed. Such theory is needed for an analysis of generalized linear and nonlinear models. A variety of new estimation methods will be considered, such as maximum likelihood, instrumental variables and generalized method of moments. Inference procedures such as $t$- and $F$- tests will be extended to new procedures that rely on asymptotic theory for their validity. These are: Wald (W); Likelihood Ratio (LR); and Score, or Lagrange Multiplier (LM) tests. The specific modeling frameworks considered may include the linear regression model and its extension to panel data, multiple equation and discrete choice models.

This course will attempt to develop the theory from the ground up. Students are of course expected to have some acquaintance with elementary econometrics before starting, but no more than would be part of a typical undergraduate curriculum. As mentioned above, the econometric theory we present is asymptotic, which means it is exactly true only in the limit as the sample size tends to infinity, but is thought to be approximately true in finite samples. In recent years, researchers have found it increasingly necessary to go beyond the confines of the standard linear regression model, where the restrictive classical assumptions lead to exact finite results about the distributions of test statistics. Greater generality in model specification carries the price that the exact finite-sample results are rarely available, and therefore the need of asymptotic theory to perform inference and hypothesis testing.
The objective is to present the students with sufficient theoretical background that they will recognize new variants of the models that they learn about in this course as merely natural extensions that fit within a common body of principles.

The training and knowledge acquired within this course are necessary for any formal economic modelling. The students will gain an understanding of the inherent characteristic of data and how to deal with the many problematic situations they might encounter in any empirical exercise.

2.4 Approach to learning and teaching

This subject is mainly analytical and the theory will be derived during the lectures from the grounds up. There will be a combination of slides and use of the blackboard since many of the theoretical results need to be derived step by step. The students have to follow the steps and be able to derive the results by themselves. Throughout the lecture, students are strongly encourage to stop the lecturer and ask questions if they are unsure about the transition from one step to another or what is the result being derived and how it fits into the subject treated on that lecture. There will be few examples to illustrate the general theoretical results and how they apply to specific models.

After the two hours lecture time, the tutorial session will be used to address any inquiries concerning previous or current lectures. At the end of each chapter, a set of homework questions will be given out. The tutorial time will be used to discuss the solutions of these questions.

Students should be aware that homework solutions would not be given as hand out. Students are responsible of taking notes of the solutions, which will be derived on the blackboard during the tutorials.

3. COURSE AIMS AND OUTCOMES

3.1 Course Aims And Outcomes

The main aim of this course is to broaden students’ knowledge of econometric modelling techniques to encompass a greater range of methods and techniques in use in modern empirical economic modelling than is available in intermediate level courses. The objective is to provide students with sufficient training to allow them to critically assess a wider range of applied work and equip them to carry out more sophisticated modelling exercises of their own. In addition, the students should be well placed to: undertake further training at the Honours and Postgraduate level; and/or to embark on a career in government, commerce or industry where practical economic modelling skills are needed.

3.2 Teaching Strategies

Lectures. There will be two hours lectures per week. These lectures will provide a broad coverage of the main topics considered in the course. However, the student should not regard their content as exhaustive or full. It is important for the student to devote a considerable amount of time to private study to achieve an appropriate level of understanding and to practice the different econometric tools introduced. Lectures provide one of the principal means of learning instruction, but it is essential that their contribution be bolstered and supported by other learning resources.
Students are expected to develop the skills and ability to derive the results and to reconstruct the tests by their own. Memorizing formulae and final results will not be of a great help in the exams; only a proper ability to develop these results will ensure success.

**Tutorials.** There will be a weekly one hour tutorial (after the lecture). Discussion will be based around a sequence of exercise sheets that will be distributed from time to time in the course. The student is expected to make a serious attempt at all questions on an exercise sheet before attending the tutorial at which it is discussed. It will not be possible to discuss all the problems set in the allotted time and should not expect all questions to be solved in depth at the tutorials.

**Textbook.** There are two textbooks recommended for this course: the first by Greene and the second by Wooldridge, both referred to in the reading list below. It is highly recommended to buy a copy of one of the reference books, particularly if you are intending to study econometrics further. There are many other suitable books for the material covered in this course. Some of them are given in the list of references and you should feel free to use any text with which you fell comfortable.

4. **STUDENT RESPONSIBILITIES AND CONDUCT**

4.1 **Workload**
It is expected that you will spend at least ten hours per week studying this course. This time should be made up of reading, research, working on exercises and problems, and attending classes. In periods where you need to complete assignments or prepare for examinations, the workload may be greater.

Over-commitment has been a cause of failure for many students. You should take the required workload into account when planning how to balance study with employment and other activities.

4.2 **Attendance**
Your regular and punctual attendance at lectures and seminars is expected in this course. University regulations indicate that if students attend less than eighty per cent of scheduled classes they may be refused final assessment.

4.3 **General Conduct and Behaviour**
You are expected to conduct yourself with consideration and respect for the needs of your fellow students and teaching staff. Conduct, which unduly disrupts or interferes with a class, such as ringing or talking on mobile phones, is not acceptable and students may be asked to leave the class. More information on student conduct is available at: [www.my.unsw.edu.au](http://www.my.unsw.edu.au)

4.4 **Keeping informed**
You should take note of all announcements made in lectures, tutorials or on the course web site. From time to time, the University will send important announcements to your university e-mail address without providing you with a paper copy. You will be deemed to have received this information.
5. Learning Assessment

5.1 Formal Requirements

Insert the formal requirements to pass the course – an example below:

‘In order to pass this course, you must:

- Achieve a composite mark of at least 50; and
- Make a satisfactory attempt at all assessment tasks (see below).’

<table>
<thead>
<tr>
<th>Component</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Tutorial</td>
<td>20%</td>
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<tr>
<td>Mid-semester test</td>
<td>35%</td>
</tr>
<tr>
<td>Final examination</td>
<td>45%</td>
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</tbody>
</table>

5.2 Assessment Details

Assignments. Of the set of exercises and problem sheets handed out during the course, four will be collected in and marked. Each will count 5% towards the final mark for the course. Suitable warning will be given of the ones that are to be counted for credit. Although discussions are encouraged between students, each Student has to submit his own individual work. Failure to submit the assignment will entail a penalty of 5% points per working day on the assignment mark. There is no make up assignment and there is a 5% penalty incurred for late submissions.

Mid-semester test. An unseen, closed book test will be help in the lecture period of Thursday, September 15th (subject to change). It will count 35% of the course credit. There will be no lectures or tutorial that week. Attendance at this test is compulsory. Students may apply to for special consideration in cases of illness and misadventure. The usual UNSW procedures regulating application for special consideration will be followed.

Final examination. This will take place in the end-of-session examination period. It will cover all course material from the beginning to the last lecture. It will be worth 45% of the credit for the course.

5.3 Special Consideration and Supplementary examinations

Information and policy about special consideration and supplementary examinations – it is recommended that there is a standard School policy, which is available on the School website and referred to in the course outline. UNSW Policy and information on special consideration, including supplementary exams can be found at: [https://my.unsw.edu.au/student/atoz/SpecialConsideration.html](https://my.unsw.edu.au/student/atoz/SpecialConsideration.html)

An example of words about special consideration for course outlines follows. These words could be used and/or modified to suit the policies/processes within your School:

UNSW policy and process for Special Consideration applies (see [https://my.unsw.edu.au/student/atoz/SpecialConsideration.html](https://my.unsw.edu.au/student/atoz/SpecialConsideration.html)). Specifically:

- Applications for special consideration (including supplementary examinations) must go through UNSW Central administration (within 3 working days of the assessment to which it refers) – applications will not be accepted by teaching staff;
• Applying for special consideration does not automatically mean that you will be granted additional assessment or that you will be awarded an amended result;

• If you are making an application for special consideration (through UNSW Central Administration) please notify your Lecturer in Charge;

• Please note: a register of applications for Special Consideration is maintained. History of previous applications for Special Consideration is taken into account when considering each case.

6. ACADEMIC HONESTY AND PLAGIARISM

The University regards plagiarism as a form of academic misconduct, and has very strict rules regarding plagiarism. For full information regarding policies, penalties and information to help you avoid plagiarism see: http://www.lc.unsw.edu.au/plagiarism/index.html

Plagiarism is the presentation of the thoughts or work of another as one's own.* Examples include:

• direct duplication of the thoughts or work of another, including by copying work, or knowingly permitting it to be copied. This includes copying material, ideas or concepts from a book, article, report or other written document (whether published or unpublished), composition, artwork, design, drawing, circuitry, computer program or software, web site, Internet, other electronic resource, or another person's assignment without appropriate acknowledgement;

• paraphrasing another person's work with very minor changes keeping the meaning, form and/or progression of ideas of the original;

• piecing together sections of the work of others into a new whole;

• presenting an assessment item as independent work when it has been produced in whole or part in collusion with other people, for example, another student or a tutor; and,

• claiming credit for a proportion a work contributed to a group assessment item that is greater than that actually contributed.†

Submitting an assessment item that has already been submitted for academic credit elsewhere may also be considered plagiarism.

The inclusion of the thoughts or work of another with attribution appropriate to the academic discipline does not amount to plagiarism.

Students are reminded of their Rights and Responsibilities in respect of plagiarism, as set out in the University Undergraduate and Postgraduate Handbooks, and are encouraged to seek advice from academic staff whenever necessary to ensure they avoid plagiarism in all its forms.

The Learning Centre website is the central University online resource for staff and student information on plagiarism and academic honesty. It can be located at:

www.lc.unsw.edu.au/plagiarism

The Learning Centre also provides substantial educational written materials, workshops, and tutorials to aid students, for example, in:

• correct referencing practices;
• paraphrasing, summarising, essay writing, and time management;
• appropriate use of, and attribution for, a range of materials including text, images, formulae and concepts.

Individual assistance is available on request from The Learning Centre.

Students are also reminded that careful time management is an important part of study and one of the identified causes of plagiarism is poor time management. Students should allow sufficient time for research, drafting, and the proper referencing of sources in preparing all assessment items.

* Based on that proposed to the University of Newcastle by the St James Ethics Centre. Used with kind permission from the University of Newcastle
† Adapted with kind permission from the University of Melbourne.

7. STUDENT RESOURCES

7.1 Course Resources

Required Text Books:


Suggested additional Readings

There are many other suitable texts at varying levels of difficulty. Some of which you may find useful include:

7.2 Other Resources, Support and Information

The University and the Faculty provide a wide range of support services for students, including:

- **Learning and study support**
  - FCE Education Development Unit ([http://education.fce.unsw.edu.au](http://education.fce.unsw.edu.au))
  - UNSW Learning Centre ([http://www.lc.unsw.edu.au](http://www.lc.unsw.edu.au))
  - EdTec - WebCT information ([http://www.edtec.unsw.edu.au](http://www.edtec.unsw.edu.au))

- **Counselling support** - [http://www.counselling.unsw.edu.au](http://www.counselling.unsw.edu.au)

- **Library training and support services** - [http://info.library.unsw.edu.au](http://info.library.unsw.edu.au)

- **Disability Support Services** - Those students who have a disability that requires some adjustment in their teaching or learning environment are encouraged to discuss their study needs with the Course Coordinator or the Equity Officer ([http://www.equity.unsw.edu.au/disabil.html](http://www.equity.unsw.edu.au/disabil.html)). Early notification is essential to enable any necessary adjustments to be made.

In addition, it is important that all students are familiar with University policies and procedures in relation to such issues as:

- **Examination procedures** and advice concerning illness or misadventure ([https://my.unsw.edu.au/student/academiclife/assessment/examinations/examinationrules.html](https://my.unsw.edu.au/student/academiclife/assessment/examinations/examinationrules.html))


8. CONTINUAL COURSE IMPROVEMENT

Each year feedback is sought from students and other stakeholders about the courses offered in the School and continual improvements are made based on this feedback. UNSW's Course and Teaching Evaluation and Improvement (CATEI) Process ([http://www.ltu.unsw.edu.au/ref4-5-1_catei_process.cfm](http://www.ltu.unsw.edu.au/ref4-5-1_catei_process.cfm)) is one of the ways in which student evaluative feedback is gathered. Significant changes to courses and programs within the School are communicated to subsequent cohorts of students.
## 9. Tentative Course Schedule

<table>
<thead>
<tr>
<th>Week</th>
<th>Date</th>
<th>Topics</th>
<th>Readings</th>
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<tbody>
<tr>
<td>1</td>
<td>July 28</td>
<td>Convergence:</td>
<td>Handout.</td>
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<td></td>
<td></td>
<td>1. Convergence in Probability</td>
<td>Chapter 2, Greene</td>
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<td>2. Convergence in Distribution</td>
<td>Appendix D, E, Wooldridge</td>
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<td>3. Law of Large numbers</td>
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<td>4. Central Limit Theorem</td>
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<td>Review of Matrix Algebra</td>
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<td>Exercise 1</td>
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<tr>
<td>2</td>
<td>August 4</td>
<td>Statistical Analysis of the Classical Regression Model:</td>
<td>Chapter 6, Greene</td>
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<td>1. Assumptions</td>
<td>Chapter 4, 5, 6, Wooldridge</td>
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<td>2. Finite sample Properties of the OLS estimator</td>
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<td>3. Consistency</td>
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<td>4. Asymptotic Normality</td>
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<td>5. Inference and Confidence Intervals</td>
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<td>6. Bayesian Estimation</td>
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<td>Exercise 2</td>
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<td>3</td>
<td>August 11</td>
<td>Generalized Least Squares Estimator:</td>
<td>Chapter 11, Greene</td>
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<td>- Nonspherical disturbances</td>
<td>Chapter 8, Wooldridge</td>
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<td>- Heteroscedasticity</td>
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<td>- Instrumental Variable Estimation</td>
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<td>Assignment 1 (Due date TBA)</td>
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<td>4</td>
<td>August 18</td>
<td>M-Estimation: Optimization Estimator</td>
<td>Chapter 11, Greene</td>
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<td>1. Maximum Likelihood Estimation</td>
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<td>a. Wald Test</td>
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<td>b. Likelihood Ratio Test</td>
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<td>c. Lagrange Multiplier Test</td>
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<td>Exercise 3</td>
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<td>5</td>
<td>August 25</td>
<td>2. Generalized Method of moment Estimation</td>
<td>Chapter 11, Greene</td>
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<td>a. GMM counterparts of Wald Test</td>
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<td>b. GMM counterparts of LM Test</td>
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<td>c. GMM counterparts of LR Test</td>
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<td>Assignment 2 (Due date TBA)</td>
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<td>6</td>
<td>Sept 1st</td>
<td>System Estimation: The seemingly Unrelated Regression</td>
<td>Chapter 15, Greene</td>
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<td>7</td>
<td>Sept 8</td>
<td>SUR Models continued…</td>
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<td>8</td>
<td>Sept 15</td>
<td>Mid Session Examination</td>
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<td>9</td>
<td>Sept 22</td>
<td>Simultaneous Equation Models</td>
<td>Chapter 16, Greene</td>
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<td></td>
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<td>a. Identification</td>
<td>Chapter 15, 16, Wooldridge</td>
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<td>b. Limited Information Estimation</td>
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<td>c. System Estimation</td>
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<td>d. Specification Tests</td>
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<td>Assignment 3 (Due date TBA)</td>
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<td>Date</td>
<td>Schedule</td>
<td>Reference</td>
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| 10  | October 6  | 1. Discrete Choice Model  
     |                        a. Probit Model  
     |                        b. Logit Model  
     | 2. Limited Dependent Variable Models  
     |                        a. Truncation  
     |                        b. Censored Data  
     |                        c. Selection  
     | Exercise 4              | Chapter 19, 20, Greene.  
                        | Chapter 17, Wooldridge    |
| 11  | October 13 | Time Series Models  
     | Assignment 4 (Due date TBA)  
     | Assignment 4              | Chapter 18, Greene  
                        | Chapter 18 Wooldridge    |
| 12  | October 20 | Time Series Models (continued…)  
     | Assignment 4 (Due date TBA)  
     | Assignment 4              | Chapter 18, Greene  
                        | Chapter 18 Wooldridge    |
| 13  | October 27 | Non-Linear Regression Models  
     |                        a. Specification Analysis  
     |                        b. Pretest Estimators  
     | Assignment 4              | Chapter 8, Greene        |
| 14  | November 3 | Review                                                                 |                                               |