

THE UNIVERSITY OF
NEW SOUTH WALES



Australian School of Business
School of Economics

ECON 3203
ECONOMETRIC THEORY
ROBERT KOHN

COURSE OUTLINE
SEMESTER 2, 2009

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1. STAFF CONTACT DETAILS

Professor Robert Kohn (Lecturer in charge)

Consultation hours: Friday 11:30 am or by appointment

Office: ASB 446

Telephone: 93852150

Email: R.Kohn@unsw.edu.au

1.1 Communication

Please contact me about any academic matter relating to the course during lectures or consultation time or email me. Please use webCT to email me, rather than my regular email address. I will try and respond to email correspondence on administrative matters within 48 hours, but not over weekends.

Please note that I do not have advance notice of the date and time of the final exam.

2. COURSE DETAILS

2.1 Teaching Times and Locations

Lecture time: 11 am to 2 pm Thursdays.

Lecture location: ASB 115

Tutorial: I may arrange a tutorial and/or Lab session in addition to the lectures depending on student demand. This will be discussed in the lectures.

2.2 Units of Credit

This course has 6 units of credit. There are three hours of lectures a week and the course workload is at least 10 hours a week.

2.3 Summary of Course

The course provides unifying methods for inference and computation for a variety of econometric models and gives some theoretical justification for the methods. The course will emphasise the links between the theory for econometric models, the computations required for econometric inference, and the application of the models to real examples.

2.4 Course Aims and Relationship to Other Courses

1. The course will give students an understanding of intermediate and advanced econometric methods that are useful in applied economics and financial econometrics. By this I mean that you will learn about the methodology, you will understand the theory or ideas behind the methodology in an informal way, and you will learn how to apply the methods to data using the Stata computer package or an equivalent package. By the end of the course you should be able to start reading the empirical economics and finance literatures.
2. The assignment work to be handed in will train you to express econometric ideas clearly and concisely. For some of the assignment work, the students will be expected to write reports that summarize the essence of the findings and their importance, with analytical details presented in an appendix.

3. The assignments will be carried out singly or in groups of two, with the latter designed so you can learn to work cooperatively.
4. Students will learn to analyze data and report results based on the evidence at hand and report the appropriate uncertainty in the results. The emphasis will be on students carrying out analyses at an advanced level.

Relation to other courses.

The course will develop ideas from first principles but students are expected to have knowledge of elementary econometrics and have analytical skills and training equivalent to those of the prerequisite course ECON2215. Students should be familiar with matrix algebra and an understanding of probability distributions and estimation. The course will give students sound preparation for courses that do applied econometrics as well as a sound basis for doing honours.

2.5 Student Learning Outcomes

By the end of the course students should have an understanding of general econometric and computational methods for tackling econometric problems and be able to apply these methods to data using econometric and statistical software. Students should also know how to perform model diagnostics to determine whether the model and the estimation approach are appropriate for the data. Students are expected to develop some facility with the mathematics of econometric models in order to develop an intuition for the models.

3. LEARNING AND TEACHING ACTIVITIES

3.1 Approach to Learning and Teaching in the Course

Learning will be through:

- Weekly lectures.
- Lecture notes available on Webct which form the basis of the lectures.
- Assigned reading supplementing the lectures. These consist of additional notes posted on WebCT as well as material from other sources.
- Problem sets whose solutions are discussed in class or lab session.
- Assignments
- Studying for the mid-session and final exams.
- Working in groups on the assigned work

3.2 Learning Activities and Teaching Strategies

The lectures will introduce students to the concepts of the methodology and how it links to the computation and data analysis. The students will assimilate these concepts by working through the notes independently outside class, doing the assigned problem sets and readings, and carrying out data analyses using Matlab and Stata.

4. ASSESSMENT

4.1 Formal Requirements

In order to pass this course, you must:

- Achieve a composite mark of at least 50% for the two exams in the course.
- Achieve a composite mark of at least 50% for the whole course.
- Make a satisfactory attempt at all assessment tasks (see below).

4.2 Assessment Details and Format

- Three assignments worth 10% each.
 - A mid-session exam in week 7 worth 25 %
 - A final exam worth 45 %.

 - Assignment 1. Given out in week 4. Due 10 days later.
 - Assignment 2. Given out in week 7 and due 10 days later.
 - Assignment 3. Given out in week 10 and due 10 days later.
- You should work on the assignments singly or in groups of 2 or 3.

You can bring into the exams one page of notes written on one side only. You should also bring a calculator. Statistical tables will be supplied if necessary.

4.3 Assignment Submission Procedure

All assignments will be handed in as hard copy to the Economics Office at or before the due date and time with a date and time stamp. Please also send me the assignment as a pdf file by the required submission date. The pdf file is **not** a substitute for hardcopy. No Word files please. Please keep a copy of all work submitted for assessment as well as any returned marked assignments. Please keep a copy of all data that you use in the course if the data was not supplied by me. This will be mainly the data that you use in your assignments. If you submit any assignment with your own data, please submit that data on disk.

4.4 Late Submission

The penalty for late submission may be up to 10% of the assignment mark for each day that it is late including weekends and public holidays. Late assignments more than 6 days late may not be accepted at all. Late penalties may be waived for circumstances outlined under Special Consideration below.

5. ACADEMIC HONESTY AND PLAGIARISM

The University regards plagiarism as a form of academic misconduct, and has very strict rules regarding plagiarism. For UNSW's policies, penalties, and information to help you avoid plagiarism see: <http://www.lc.unsw.edu.au/plagiarism/index.html> as well as the guidelines in the online ELISE tutorial for all new UNSW students: <http://info.library.unsw.edu.au/skills/tutorials/InfoSkills/index.htm>.

6. COURSE RESOURCES

Prescribed text – Greene, W.H.(2008) Econometric Analysis, 6th edition. Pearson International Books.

Course notes that will be available on Webct. Vista.

Introduction to Econometrics (2nd Edition) (Pearson International Edition) (2007)

Course notes that will be available on Webct. Vista.

Other useful references

Stock, J. and Watson, M. (2007) Introduction to Econometrics (2nd Edition) (Pearson International Edition) (2007) . This is an excellent introduction to the ideas of econometrics.

Wooldridge, J. M. Introductory Econometrics: a modern approach. 3rd edition. Greene, W.H.(2008) Econometric Analysis, 6th edition. Pearson International Books. This is also a very good book.

Software: Stata and Matlab will be available in the Quad Labs.

Reading materials. Most of the reading materials will be available on the Webct Vista page, from the internet and from the UNSW library.(<http://info.library.unsw.edu.au/>)

WebCT Vista The course will make extensive use of WebCT Vista. I will place the notes, the problem sets and their solutions, and Stata and Matlab scripts. You can also send me emails through WebCT Vista.

You can access the site through <http://vista.elearning.unsw.edu.au/>

Help with Computer packages. Notes on Stata and Matlab will be posted on WebCt and updated occasionally. Some aspects of the two packages will also be in the lecture and will be discussed in class.

7. COURSE EVALUATION AND DEVELOPMENT

Each year, we seek feedback from students and other stakeholders about the courses we offer in the Australian School of Business. We evaluate and use

your course-level feedback, both quantitative and qualitative, to guide our continuing monitoring and redesigning of the course.

Change is not automatically linked to any one piece of feedback as our teaching reflects on a range of feedback sources over time, including our evaluations of assessment performance. This continual improvement process can affect one or more particular areas of the course, whether this has to do with structure, content, resources, delivery or assessment.

The UNSW Course and Teaching Evaluation and Improvement (CATED) Process (http://www.ltu.unsw.edu.au/ref4-5-1_catei_process.cfm) is one of the ways in which we gather student evaluative feedback. As in this case, we communicate significant changes within the course to subsequent cohorts of students.

I will also ask you at the start of the course what you are expecting from the course and see if I can accommodate some of the requests. I will also ask you for feedback on how things are going around weeks 5 or 6 of the course.

8. STUDENT RESPONSIBILITIES AND CONDUCT

Students are expected to be familiar with and adhere to university policies in relation to class attendance and general conduct and behaviour, including maintaining a safe, respectful environment; and to understand their obligations in relation to workload, assessment and keeping informed.

Information and policies on these topics can be found in the 'A-Z Student Guide': <https://my.unsw.edu.au/student/atoz/ABC.html>. See, especially, information on 'Attendance and Absence', 'Academic Misconduct', 'Assessment Information', 'Examinations', 'Special Consideration', 'Student Responsibilities', 'Workload' and policies such as 'Occupational Health and Safety'.

8.1 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.

8.2 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.

8.3 Special Consideration and Supplementary Examinations

You must submit all assignments and attend all examinations scheduled for your course. You should seek assistance early if you suffer illness or misadventure which affects your course progress. For advice on UNSW policies and procedures for granting special consideration and supplementary exams, see:

‘UNSW Policy and Process for Special Consideration’:
<https://my.unsw.edu.au/student/atoz/SpecialConsideration.html>

Students should note the following

- 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 that a register of applications for Special Consideration is maintained. History of previous applications for Special Consideration is taken into account when considering each case.

ASB Policy and Process for Special Consideration and Supplementary Exams

In the case of undergraduate students in the ASB, requests for special consideration are determined by a Faculty wide panel. If the Faculty panel grants a special consideration request, this may entitle the student to sit a supplementary examination. In such cases the following procedures will apply:

- Supplementary exams will be scheduled centrally and will be held approximately two weeks after the formal examination period. Actual date will be advised by mid-semester.
- Where a student is granted a supplementary examination as a result of a request for special consideration, the student’s original exam (if completed) will not be marked and only the mark achieved in the supplementary examination will count towards the final grade.

The ‘ASB Policy and Process for Special Consideration and Supplementary Exams in Undergraduate Courses’ is available at:
<http://wwwdocs.fce.unsw.edu.au/fce/current/StudentSuppExamProcedure.pdf> .

Further information for undergraduate students is on the ASB website (see ‘[Policies and Guidelines for Current Students](#)’).

8.4 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

8.5 Occupational Health and Safety

UNSW Policy requires each person to work safely and responsibly, in order to avoid personal injury and to protect the safety of others. For more information, see <https://my.unsw.edu.au/student/atoz/OccupationalHealth.html>.

8.6 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. It is also your responsibility to keep the University informed of all changes to your contact details.

9. ADDITIONAL STUDENT RESOURCES AND SUPPORT

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

- **ASB Education Development Unit (EDU)** (www.business.unsw.edu.au/edu)
Academic writing, study skills and maths support specifically for ASB students. Services include workshops, online and printed resources, and individual consultations. EDU Office: Room GO7, Ground Floor, ASB Building (opposite Student Centre); Ph: 9385 5584; Email: edu@unsw.edu.au
- **UNSW Learning Centre** (www.lc.unsw.edu.au)
Academic skills support services, including workshops and resources, for all UNSW students. See website for details.
- **Library training and search support services:** <http://info.library.unsw.edu.au>
- **UNSW IT Service Desk:** Technical support for problems logging in to websites, downloading documents etc. Library, Level 2; Ph: 9385 1333.
Website: www.its.unsw.edu.au/support/support_home.html
- **UNSW Counselling Service** (<http://www.counselling.unsw.edu.au>)
Free, confidential service for problems of a personal or academic nature; and workshops on study issues such as 'Coping With Stress' and 'Procrastination'.
Office: Level 2, Quadrangle East Wing; Ph: 9385 5418

- **Student Equity & Disabilities Unit** (<http://www.studentequity.unsw.edu.au>)
Advice regarding equity and diversity issues, and support for students who have a disability or disadvantage that interferes with their learning.
Office: Ground Floor, John Goodsell Building; Ph: 9385 4734

10. COURSE SCHEDULE

TOPIC 0: KNOWLEDGE OF PROBABILITY AND STATISTICS

Things you should know.

On entering the course you should understand the following concepts.

However, let me know as early as possible if you need revision on some of these concepts because we can go over them in class, and I can write some notes on these as well. These ideas are also covered in the text.

1. Random variables and probability distributions. See appendix B of Greene.
2. Normal distribution, t distribution F distribution. See appendix B4 of Greene.
3. Random sampling, properties of the sample mean, i.e., its expected value and variance, law of large numbers, central limit theorem. See appendix C of Greene.
4. Bias, consistency, standard error. See appendix C of Greene.
5. The ideas behind hypothesis testing.
6. The ideas behind confidence intervals. See appendix C.6
7. Vector and matrix algebra. See appendix A of Greene. See also class notes.

Topic 1. (Weeks 1 and 2 approximately).

The linear regression model.

- The linear regression model. Intuition and expression in matrix form. Least squares analysis.
- Residual analysis, diagnostic plots. Leverage, standardised and studentised residuals, maths behind this.
- Normal probability plots and quantile quantile plots.
- R^2 and adjusted R^2 .
- Histograms and density estimation.
- Prediction in regression.
- F test
- Interpretation of t statistics and regression coefficients
- Added variable plots.
- Transforming the dependent variable. Box –Cox transformation.
- Cross-validation..

Reading: Class notes.

Greene: Chapters 1 to 3

**Topic 2. (Week 3 approximately).
Inference in linear regression models.**

- Likelihood
- Large sample theory.
- Robust standard errors.
- Likelihood cross-validation

Reading: Class notes. This is the main source.

Greene. Chapters 4 to 7.

Topic 3. (Weeks 4 and 5 approximately) Inference using simulation methods.

- Bootstrap analysis. Parametric and non parametric bootstrap.
- Bootstrap confidence intervals.
- Introduction to Matlab and bootstrap using Matlab

Reading: Class notes. This will be our main source.

Greene, pp. 598-598.

Efron and Tibshirani (1994) An introduction to the bootstrap. New York: Chapman Hall.

**Topic 4. (Weeks 6 and 7 approximately) Binary and multinomial regression.
Generalized linear models.**

- Logistic Model
- Likelihood
- Maximum likelihood estimation
- Large sample inference.
- Likelihood ratio test.
- ROC curve analysis.
- Cross validation and bootstrapping
- Generalized linear models.
- Classification.
- Discriminant analysis.

Reading: class notes:

Greene: chapter 23

Week 7 Mid session exam

Topic 5. (Week 8) . Multivariate normal distribution

- Definition
- Estimation.
- Application to optimal asset allocation.
- Multivariate regression.
- Vectors and Matrices.

Reading: Class notes.
Greene: Appendix B7 and B.11, Chapter 10.

Topic 6. (Weeks 9 and 10 approximately) Panel data models.

- **Introduction**
- **Fixed effects**
- **Random effects**
 - Greene: Chapter 9
 - Stock and Watson: Chapter 10.
 - Class notes.

Topic 7. (Weeks 10 and 11 approximately) Endogeneity

- Concepts
- Instrumental Variables Estimation.
- Simultaneous equations models.

Class notes.
Stock and Watson; Chapter 12
Greene Chapters 12 and 13.

Topic 8. (Week 12) A choice of one of the following topics.

Time series methods.

- Autoregressive models, seasonal models.
- Arch and garch models and diagnostics.
- Prediction and diagnostics.

Class notes
Greene: Chapters 19 to 21

GMM estimation

Greene: Chapter 15