THE UNIVERSITY OF QUEENSLAND

SCHOOL OF ECONOMICS

SEMESTER 2, 2004

COURSE OUTLINE

ECON7300 STATISTICS FOR BUSINESS AND ECONOMICS

INCOMPATIBLE: BA815, ECON1320 OR EC134 OR 136 OR EC834
P: SNR MATHS 1 OR B OR MATH1040 OR MP127 OR MT140 OR EQUIVALENT

UNITS: #2

LECTURER	CONSULTATION TIMES
A/Prof. Steve Harrison (Course Coordinator) Room 639, Colin Clark Building Tel. (07) 3365 6340 Fax. (07) 3365 7299 s.harrison@economics.uq.edu.au	Tuesday 11am-1 pm, or by appointment. Please use email to contact me.
Dr Neil Karunaratne Room 552, Colin Clark Building Tel. 3346 9539 n.karunaratne@economics.uq.edu.au	Tuesday 1 – 5pm or by appointment

TUTORS
Alan Raine	3365 6246	To be advised
Dennis Petrie	3365 4028	

LECTURES

	DAY	TIME	LOCATION
LECTURES	Tuesday	2-4 pm	Room S304, Social Sciences Building (#24))

COMPUTER LAB SESSIONS
In addition to the lecture, students should attend one workshop per week. Several timeslots have been timetabled. Students are required to sign-on for a workshop via mySI-net. Workshops will commence in Week 3 of classes.

COURSE WWW DETAILS

Various materials for this course, such as course outline, reading list, some lecture notes and tutorial materials may be available at the following location
http://www.uq.edu.au/economics/
The password required to access these materials will be given to you in class.

AIMS AND OBJECTIVES

Scope and Objectives

ECON7300 is a postgraduate course in statistical methods designed primarily for Business, Commerce and Economics students with little previous training in statistics. The course covers a variety of techniques applicable to the collection, presentation, interpretation and use of quantitative data. Key procedures for measuring and analysing economic and business variables are introduced. This course is designed to provide a solid understanding of quantitative concepts used in economics, business and finance. It is designed to help the students:

- *improve their ability to gather, analyse and interpret data for decision-support*

- *become practical statisticians working with methods widely used in business*

- *develop confidence and essential skills in statistics and data analysis.*

Why Study Statistics for Business and Economics?

The answer is simple. We live and work in an uncertain world. We take risks on all sorts of things daily: weather, markets, traffic, investments, and casinos. Businesses and governments operate with similar uncertainties. Information costs are high, and we can never measure everything. Inevitably important decisions must be made based on a limited set of information. A training in statistics will help you to make better decisions for the future. More specifically,

- *it will give you a new perspective on dealing with the mass of new information confronted daily.*

- *you will appreciate much better the management of error in data analysis.*

TEXTBOOK

There is no set text book for this course.

REFERENCE BOOKS

Harrison, S.R. and Tamaschke, R.H.U. (1993), *Statistics for Business, Economics and Management*. Prentice Hall, Sydney.

This book is now out of print, but multiple copies are available in the Social Sciences and Humanities Library. Some second-hand copies may be available.

OTHER MATERIALS

Comprehensive lecture material will be made available.

A battery operated scientific calculator (preferably with statistical and regression functions) will be required for tutorials and examination purposes. Programmable calculators *are* permitted in the examination, but not if they have a 'qwerty' key pad.

Access to a computer with at least Windows 3.1 will facilitate practical work and revision.

Suggested other reading (numerous other relevant books are available in the SS&H library).

LECTURE TOPICS:

Lecture no.	Topic
1	Course overview; data collection and analysis; descriptive statistics
2	Probability concepts and formulae; random variables
3	Probability distributions – the normal, standard normal and binomial
4	Theoretical sampling distributions, and confidence intervals
5	Hypothesis testing
6	Analysis of variance
7	Two-variable regression and correlation analysis
8	Multiple regression analysis
9	Time series analysis
10	Non-parametric statistics – runs test, tests on means, correlation testing
11	Price index number
12	Official statistics – including labour force statistics
13	Revision

WORK LOAD

Ten hours per week including lecture and tutorials.

THE TEACHING AND LEARNING PROCESS

In this course the lecturing and tutorial staff will employ a combination of techniques centered on *problem-based learning*.

Lectures: Lectures will include discussions of the theoretical underpinnings of techniques and their applications to real world problem solving. Given the nature of the course and the clientele, emphasis will be placed on practical applications of techniques. Lectures will be complemented by the following:

Collaborative problem solving: During the tutorials you will be required to form small groups (of 4-5 students) and engage in *solving problems with the active support of the lecturer/tutor.* This will not be done regularly but from time to time.

Tutorials in the traditional mode: Some tutorial weeks will be devoted to tasks where the lecturer/tutor will take a more active role and go through the problems step by step. The students are strongly encouraged to participate actively in discussions and ask questions. Students will also be asked to solve one or two problems by themselves in small groups employing

Computer lab sessions: For some tutorials computer lab sessions will be organised to work on selected topics, and especially regression analysis. You may have to work individually or in small groups.

The semester project: This is designed in a way such that students can apply statistical techniques to real world problems in an independent manner. From past experience, once the students complete the project they gain a clear idea about the course and applications of statistics to real world issues. The project is described in detail later in this outline.

Past experience indicates that this course caters to a diverse group of students who differ widely in terms of their background, ability and aptitude, career goals and aspirations. The topics covered and subject material delivered are designed for this diverse clientele. Any individual needs not catered for during the lecture/tutorial hours will be addressed during consultation hours. For instance, some students may be more interested in statistical theory while others may be more interested in applications.

You are strongly encouraged to consult your lecturer/tutor regularly during consultation times or at times mutually convenient. In consulting your lecturer/tutor you should approach with a check-list of your problems.

METHOD OF ASSESSMENT

Detailed distribution of marks

1.	Total progressive	55%
2.	Final examination	45%
	Total	100%

Breakdown of progressive marks

Mid-semester test	20%
Project	35%
Total progressive	55%

(a)   Mid-Semester Test (20 per cent)

One test on progress lasting approximately **60 minutes** will be conducted during class time on a date to be determined. This exam will form **20%** of the overall assessment and will be based on materials covered in **topics up to analysis of variance**. This test will consist of 5-7 short-answer questions.

(b)   Project in ECON7300 on Statistics (35%)

To complete the requirements of this course, you must undertake a project. This will involve a series of tasks including gathering data, analysis, testing relationships and reporting results. The project tasks can be done sequentially through the semester and compiled as a folio. You are encouraged to undertake this project using a computer spreadsheet package such as Microsoft Excel or Statistical Package for the Social Sciences (SPSS). The project must be completed satisfactorily to meet the requirements of the course.

Background

The project for ECON7300 requires you to undertake analysis of the relationship between two variables of special interest. You are expected to:

- *gather and describe the data, hypothesise and analyse a relationship between two variables as well as forecast the dependent variable.*

- *think and read about the relationship you want to analyse and make sure that you can obtain relevant data.*

- *gather data for the two variables over a suitable time period, preferably one that is up-to-date.*

To reveal some interesting relationship the data must exhibit some sizeable fluctuation. You will have to develop the rationale for choosing the two variables: why you expect them to be related and in what way.

Be imaginative in your choice of data. You may care to analyse global relationships (e.g. world population and global pollution) or you may be interested in commodity markets (e.g. world price of crude oil and global petroleum production). You may be interested in the average share price of a particular company over time and its relation to reported profits, or in housing starts in Queensland, or in the relationship between two macroeconomic variables, e.g. inflation and unemployment or interest rates and investment. The choice is yours, but part of the project assessment will be based on how imaginative and creative you have been.

Tasks

(1)   Select two economic, business or financial variables that you believe are in some way related. Discuss your rationale for selecting the variables and describe which one you have chosen to be the dependent variable. Hypothesise formally the relationship between the two variables, including your prior expectation of the slope of the linear regression equation you intend to estimate between the two.

(2)   Gather data for the two variables chosen, for a particular country, state, or smaller unit (e.g. company, or geographical area). You must have sufficient observations for each variable for some decent analysis and the observations must be for compatible time periods. Record the source(s) of your data. Present all data in a table and give this table a proper title, names of variables, time period and units of variables.

(3)   For both variables calculate the two main measures of central tendency and the two main measures of dispersion.

(4)   Present frequency distributions for both variables separately.

(5)   Write a short summary description of both variables, including discussion of the main patterns, outliers, odd patterns, the spread etc (<100 words).

(6)   Plot using graph paper the relationship between the dependent and independent variables (called y and x, respectively) with the dependent variable y on the vertical axis. Label the graphs properly. Does this graph tell you anything of importance?

(7)   A journalist has asked you to provide a brief description of the main message in the data and this graph. Write a brief reply to the journalist in non-technical terms (approximately 100 words).

(8)   What is the value of the sample covariance?

(9)   Estimate the correlation coefficient between the two variables.

(10)   Test the hypothesis that there is no correlation between the two variables.

(11)   Estimate the simple linear regression relationship between the dependent and independent variables. Report the estimated regression equation in the appropriate form. What are the values of:

- b_0, and the associated standard error?
- b_1, and the associated standard error?
- r^2?

(12)   Conduct the appropriate statistical tests to:

- test whether the overall relationship is statistically significant;
- test the hypothesis that β_1 = hypothesised slope (as discussed earlier) at the 5% level of significance.

(13)   Briefly interpret the results obtained in parts (11) and (12). In particular, what do the signs and magnitudes of b_0 and b_1 imply? Give this interpretation in technical language and then in everyday simpler language.

(14)   Plot the residuals, e_i, from your regression equation in relation to the predicted values of the dependent variable y_i.

(15)   What are the two main problems in the regression analysis you conducted? How would you attempt to resolve these problems?

(16)   Now extend to extend your analysis to multiple regression by adding two additional independent variables. Which variables would you add to your equation? Why? Estimate a multiple regression with the additional variables that you think to be important.

(17)   If you are using time series data, use graph paper or computer graphics to plot the dependent variable for the time period of your data and allow for forecasts 5 periods beyond the sample period (to include forecasts calculated below). If you are using cross-sectional data, plot y against x, and generate predicted values of y for out-of-sample values of x.

(18)   If you are using time series data, estimate the linear trend between the *dependent* variable, y_t, and time, t (setting the first time period of your data to 1, second to 2, etc.). Report the estimated regression equation in the appropriate form.

- Is there a significant trend? Comment on its direction and magnitude.

(19)   If you are using time series data, use the estimated trend equation to forecast y for 5 time periods beyond the sample period. Plot these forecasts in the graph drawn for Q.17 labelled ("Trend Forecast").

(20)   How can forecasting (prediction) help us better understand the relationship between the dependent and independent variable?

(21)   In simple non-technical language, comment briefly on the main results from your project. What does the analysis mean for us all? What does it mean for the world?

(22)   In a concluding paragraph mention the main assumptions underlying your analysis. Comment of the consequences of any violations of regression assumptions.

Submit this as a folio with your name, student number and ECON7300 on the top and question numbers clearly marked, by the due deadline: Friday 22 October, 2004.

- Late submission will only be allowed with prior approval of course coordinator and must be based on genuine grounds e.g. medical, work related emergencies. Late submission without approval will entail a penalty of 1 mark per day after the deadline.

In this assignment you will be tested on your ability to think about a real word issue and your ability to apply the analytical tools of statistics to real world problems. The ability to apply classroom theory penetratively in a practical context is an important criterion for anyone striving for a high grade for this assignment. You are expected to clearly set out the issue that you are going to investigate. Think and read about the issues you want to analyse and make sure that you can obtain relevant data.

Your project will provide some form of practice for your final examination where similar tasks and criteria are to be applied. You are welcome and encouraged to consult the Lecturer-in-Charge at any stage of your project.

(c)   End of Semester Examination (45%)

There will be a two-hour end-of-semester examination made up of short answer questions covering theory and applications. Further details about the format of this examination will be provided during the lectures. This examination will focus on the following topics:

- Estimation
- Hypothesis testing (Z, t, F & Chi-Squared distributions)
- Analysis of variance
- Two-variable regression and correlation analysis
- Multiple regression analysis
- Time series analysis
- Nonparametric statistics
- Index numbers
- Official statistics

The end-of-semester examination tests your:

- comprehension of materials covered in all lectures;
- ability to develop a logically coherent argument to questions posed.

ASSESSMENT CRITERIA

The short questions in the examination and the project will be marked according to the following general criteria.

Grade	Criteria
7	Excellent in both comprehension of material and development of a coherent argument, neat presentation with diagrams where appropriate, choice of analytical techniques appropriate to the problem, adequate interpretation of the statistical findings and a critical appraisal of the quality of your estimates and limitations of techniques used. Where appropriate you must mention the assumptions under which your analysis is valid and what the consequences are of any violations of underlying assumptions. **This is especially applicable to the project**.
6	Strong in both comprehension of material and development of a coherent argument, neat presentation with diagrams where appropriate, limitations of techniques used. Where appropriate you must mention the assumptions under which your analysis is valid and what the consequences are of any violations of underlying assumptions.
5	Adequate knowledge of the material and organisation into an argument. Correct understanding of the methods used and discussion of statistical quality of estimates, adequate interpretation of the statistical findings.

4	Adequate knowledge of the material but the organisation of the argument was weak. Inadequate discussion of statistical quality of estimates, inadequate interpretation of the statistical findings.
3	While an adequate knowledge was indicated, the analysis was unfocussed and the question was not directly answered.
2	Patchy knowledge and weak organisation, methodological errors.
1	No real attempt to answer the question.

PLAGIARISM

Plagiarism is the action or practice of taking and using as one's own, the thoughts or writings of another (without acknowledgement). The following practices constitute acts of plagiarism and are a major infringement of the University's academic values:

- Where paragraphs, sentences, a single sentence or significant parts of a sentence are copied directly, and are not enclosed in quotation marks and appropriately footnoted;
- Where direct quotations are not used, but are paraphrased or summarised, and the source of the material is not acknowledged either by footnoting or other simple reference within the text of the paper; and
- Where an idea which appears elsewhere in printed, electronic or audio-visual material is used or developed without reference being made to the author or the source of that material.

When a deliberate act of plagiarism is proven, the results of the assignment, exercise or procedure concerned may be annulled and such other action may be taken as Senate may consider appropriate in the circumstances of the case. This may extend to loss of credit in a subject and/or suspension of enrolment at the University. Don't take a chance! This University takes a very dim view of all forms of cheating.

Guidelines for correct referencing techniques can be found in the School of Economics publication *Guide for Assignment Presentation*, which is available for purchase from the Faculty Resource Centre, or can be accessed on the School of Economics web site, www.uq.edu.au/economics/

UQ DISABILITY ACTION PLAN

In accordance with the UQ Disability Action Plan, any student with a disability who may require alternative academic arrangements in the course is encouraged to seek advice at the commencement of the semester from a Disability Adviser at Student Support Services.

The University Health Service can arrange advice and assistance on professional accreditation/registration issues that might arise as a result of alternative arrangements.

Teaching Team

Steve Harrison (Course Co-ordinator)
Graduated with Agricultural Science and Economics degrees and PhD from The University of Queensland. Main teaching areas are Natural Resource and Environmental Economics. Has co-authored and co-edited 12 books, 60 journal articles and about 100 book chapters and published conference papers. Editor-in-Chief of *Small-scale Forest Economics, Management and Policy*. Undertaking research projects in the Philippines and Vietnam, funded by the Australian Centre for International Agricultural Research.

Dr Neil Karunaratne

SPECIAL EXAMINATIONS

The following is an extract from the Faculty of Business, Economics and Law *Faculty Guidelines and Amended 2004 Program Rules for Students enrolled in Undergraduate or Postgraduate Coursework Programs.* Full details can be found at www.bel.uq.edu.au

Special examinations will be granted if a student can demonstrate medical, compassionate or exceptional circumstances or hardship. Full documentation must accompany your application.

The following would normally constitute acceptable grounds for applying for special examinations:
- Illness or a serious health problem;
- Serious personal or emotional trauma;
- A sporting or cultural commitment at state, national or international representative level;
- Serious incapacity during an examination;
- In very exceptional circumstances, an important planned family or social commitment or unavoidable work commitment.

The following would **NOT** normally be acceptable grounds for applying for special examinations:
- Holiday arrangements, including overseas travel;
- Mis-reading an examination timetable;
- Social and leisure events, including sporting or cultural commitments, other than at state, national or international representative level;
- Applications made after the 7-day deadline;
- Carrying an overload, that is undertaking more than eight (#8) units per semester;

APPLICATION PROCEDURE - MID-SEMESTER EXAMINATIONS
Students requiring a special examination for mid-semester should contact the Course Co-ordinator and provide the documentation referred to below.

APPLICATION PROCEDURE - END OF SEMESTER EXAMINATIONS
All applications for special examinations for end of semester examinations are to be made on the form "Application for Special Examination" and accompanied by relevant documentation (see below). The application form must be submitted to the Student Centre, Level 1, J.D. Story Building (St. Lucia students) or the Student Centre, Ipswich Campus.

DOCUMENTATION REQUIRED TO ACCOMPANY APPLICATION FOR SPECIAL EXAMINATIONS
In the case of an application based on medical grounds, a student must present a **medical certificate** covering the date of the examination and stating the nature of the relevant impairment. Application made on non-medical grounds must be supported by a **Statutory Declaration** stating the facts on which the application relies and any relevant documentation to support the case. (See Section 2.3.1 of the *BEL Faculty Guidelines* for further details.)

A request for a special examination must be made as soon as possible, but not later than SEVEN DAYS after the date of the examination/test.

It is possible that Special Examinations may be conducted as oral examinations. See *BEL Faculty Guidelines* for further details.