

Course Title	:	Introduction to Statistics and Econometrics
Course Code	:	ECO3105
Recommended Study Year	:	3 and 4
No. of Credits/Term	:	3
Mode of Tuition	:	Lecture-Tutorial
Class Contact Hours	:	2-hour lecture per week 1-hour tutorial per week
Category in Major Prog.	:	Major in Economics/GEB (Required Course)
Discipline	:	Economics
Prerequisite(s)	:	(a) ECO2101 Introduction to Economics, or (b) ECO2104 Introduction to Microeconomics and ECO2105 Introduction to Macroeconomics, or (c) BUS2105 Microeconomics for Business
Co-requisite(s)	:	N/A
Exclusion(s)	:	N/A
Exemption Requirement(s)	:	N/A

Brief Course Description

This course equips students with the statistical tools to analyse economic and business phenomena quantitatively. It attempts to bridge the gap between the abstract world of economic theory and the real world of human activity. Econometrics is especially useful in quantifying and analysing the economic activities of firms, consumers, and the public sector, and in studies of social behaviour.

Aims

The course aims to enable the students to use econometrics to describe reality, test hypotheses, and make forecasts based on reasonable assumptions and conditions. Students will learn to quantify economic activity by estimating key parameters that describe and predict behaviour. Students also will learn hypotheses testing, viz. the evaluation of alternative theories with quantitative evidence. Much of economics involves building theoretical models and testing them against evidence. Finally, students will learn to use econometric tools to predict the future and to simulate alternative scenarios, based on regularities as demonstrated in the past and plausible assumptions.

Learning Outcomes (LOs)

Upon completion of this course, successful students are expected to:

1. recall and describe the basic principles, concepts and theories in econometrics;
2. apply appropriate econometric techniques and utilise basic computer software packages introduced in class to the analysis of economic problems;
3. interpret, evaluate, and explain the results from hypotheses testing and estimation; and
4. predict the outcomes of economic policies.

Indicative Contents

- I. The nature and scope of econometrics
 - a. What is econometrics
 - b. Why study econometrics
 - c. The methodology of econometrics
- II. A review of basic statistical concepts
 - a. Some common notations
 - b. Experiment, sample space, sample point, and events
 - c. Random variables and probability
- III. Some important probability distributions
 - a. Distribution of the sample mean; descriptive parameters for probability distributions
 - b. The normal distribution
 - c. The chi-square (χ^2) distribution
 - d. The t distribution
 - e. The F distribution
- IV. Statistical inference: estimation and hypothesis testing
 - a. The meaning of statistical inference
 - b. Estimation and hypothesis testing: the twin branches of statistical inference
 - c. Estimation of parameters
 - d. Properties of point estimators
 - e. Statistical inference: hypothesis testing
- V. Basic ideas of linear regression: The two-variable model
 - a. The meaning of regression
 - b. The population regression function
 - c. The nature of the stochastic error term
 - d. The sample regression function
 - e. Two-variable versus multivariate or multiple linear regressions
 - f. Estimation of parameters: The method of ordinary least squares
- VI. The two-variable regression model: Hypothesis testing
 - a. The classical linear regression model

- b. Variances and standard errors of ordinary least squares estimators
- c. Why ordinary least squares?
- d. The sampling, or probability, distribution of least squares estimators
- e. Hypothesis testing
- f. Goodness of fit: The coefficient of determination
- g. Reporting the results of regression analysis

VII. Multiple regressions: Estimation and hypothesis testing

- a. The three-variable linear regression model
- b. Assumptions of the multiple linear regression model
- c. Estimation of parameters of multiple regressions
- d. Goodness of fit in estimated multiple regressions
- e. Hypothesis testing in a multiple regression: Regression coefficients
- f. Two-variable regression in context of multiple regression
- g. Specification errors and other errors

VIII. Functional forms of regression models

- a. How to measure elasticity: The log-linear model
- b. Comparing linear and log-linear regressions
- c. Multiple log-linear regression models
- d. How to measure the growth rate: The semi-log model
- e. Reciprocal models
- f. Polynomial regression models

IX. Use of dummy or categorical variables

- a. The nature of dummy variables
- b. Regression with one quantitative variable and one qualitative variable
- c. Regression on a quantitative variable and a qualitative variable with more than two classes or categories
- d. Regression on one quantitative variable and two qualitative variables
- e. Comparing two regressions
- f. The use of dummy variables in seasonal analysis
- g. What happens if the dependent variables are dichotomous or dummy

Teaching Method

Lectures combined with tutorials involving computer lab sessions. Real world examples and actual data analysis will be used to illustrate the applications of different econometric models. We introduce the econometrics computer software in lab sessions and provide hands-on experience to students by conducting quantitative analysis.

Measurement of Learning Outcomes

1. Tutorial participation will assess students' understanding of basic econometric principles and concepts, as well as their ability to apply appropriate techniques and software-based tools to economic problems and exercises. (LOs 1-2)
2. Presentations will assess students' ability to apply econometric techniques to empirical data, interpret results, and communicate findings clearly in relation to economic questions. (LOs 2-4)
3. A final examination will be used to assess students' overall understanding and their skill in applications to solve economic problems. (LOs 1-4)

Assessment

Continuous assessment : 40%: Tutorial Participation (10%), Presentation (30%)

Final examination : 60%

Required/Essential Reading

Anderson et al., *Statistics for Business and Economics*, 14th Edition, 2020.

Stock, James H, and Mark, W. Watson, *Introduction to Econometrics*, 4th Edition, Global Edition, 2020

Gujarati, Damodar, *Essentials of Econometrics*, McGraw-Hill, 5th Edition, 2022.

Recommended/Supplementary Readings

Studenmund, A.H., *Using Econometrics: A Practical Guide*, 5th Edition, New York: Pearson Addison-Wesley, 2006.

Angrist, Joshua D., and Jörn-Steffen, Pischke, *Mostly Harmless Econometrics: An Empiricist's Companion*, Princeton: Princeton University Press, 2009.

Wooldridge, Jeffrey, *Introductory Econometrics*, 4th International Edition, Harlow: South Western College, 2008.

Important Notes:

- (1) Students are expected to spend a total of 9 hours (i.e. 3 hours of class contact and 6 hours of personal study) per week to achieve the course learning outcomes.
- (2) Students shall be aware of the University regulations about dishonest practice in course work, tests and examinations, and the possible consequences as stipulated in the Regulations Governing University Examinations. In particular, plagiarism, being a kind of dishonest practice, is "the presentation of another person's work without proper

acknowledgement of the source, including exact phrases, or summarised ideas, or even footnotes/citations, whether protected by copyright or not, as the student's own work". Students are required to strictly follow university regulations governing academic integrity and honesty.

- (3) Students are required to submit writing assignment(s) using Turnitin.
- (4) To enhance students' understanding of plagiarism, a mini-course "Online Tutorial on Plagiarism Awareness" is available on <https://pla.ln.edu.hk/>.
- (5) Students must adhere to the University's guidelines and practices when using Generative Artificial Intelligence (AI) tools. The official documents "Guidelines for Using GAI Tools at Lingnan University" and "Best Practices for Ethical and Responsible Use of GAI Tools in Course Assessments" can be found here: <https://www.ln.edu.hk/tlc/generative-artificial-intelligence/gai-guidelines-bestpractices>.