

ECO3105: Introduction to Statistics and Econometrics

Recommended Study Year	:	2 and 3
No. of Credits/Term	:	
Mode of Tuition	:	Lecture-Tutorial
Class Contact Hours	:	3 hours per week
Category in Major Prog.	:	Major in Economics/GEB (Required Course)
Discipline	:	Economics
Prerequisite(s)	:	(a) ECO2101 Introduction to Economics, or (b) Level 3 or above in HKDSE Economics, or (c) BUS2105 Microeconomics for Business
Co-requisite(s)	:	N/A
Exclusion(s)	:	N/A
Exemption Requirement(s)	:	N/A

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Brief Course Description

This course equips students with the statistical tools to analyze 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 analyzing 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 using econometric methods.

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. 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. meaning of statistical inference
 - b. Estimation and hypothesis testing: the twin branches of statistical inference
 - c. Estimation of parameters
 - d. 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. of fit in estimated multiple regressions
 - e. 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

Measurement of Learning Outcomes

1. Exercises in the computer lab are designed to assess students' comprehension of theories and their computer technical proficiency. (LO 2)
2. Presentations will assess students' ability to describe and apply the principles, concepts and theories in econometrics. (LOs 1 - 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)

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.

Assessment

Continuous assessment	:	40%
Final examination	:	60%

Recommended/ Supplementary Readings

- Gujarati, Damodar N., *Essentials of Econometrics, 5th Edition*, Sage, 2022.
- Stock, James H., and Mark W. Watson, *Introduction to Econometrics, 4th Edition, Global Edition*, Pearson, 2020.
- Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern approach, 7th Edition*, Cengage, 2020.
- Studenmund, A.H., *Using Econometrics: A Practical Guide, 7th Edition*, Pearson, 2017.
- Anderson et al. *Statistics for Business and Economics, 14th Edition*, Cengage, 2020.

Warning against plagiarism

Sources of quotations should be spelled out clearly. Taking others' writings as one's own is plagiarism and will be taken seriously and punished accordingly.

Important Notes:

- (1) Students are expected to spend a total of 6 hours (i.e. 3 hours of class contact and 3 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 are required to fill in a mid-term survey and the end of course CTLE survey.

Rubric for Final Examination (60%)

Learning Outcome	Excellent A-, A	Good B- to B+	Acceptable C- to C+	Poor D or below
Understand basic principles, concepts, and theories in econometrics (15%)	Thorough understanding of principles, concepts, and theories	Good understanding of principles, concepts, and theories	Some understanding of principles, concepts, and theories	Little understanding of principles, concepts, and theories
Apply econometric techniques and utilize basic computer software (15%)	Mastery of the applications	Good grasp of the applications	Some grasp of the applications	Little grasps of the applications
Interpret, evaluate, and explain results from hypotheses testing and estimation (15%)	Mastery of these concepts	Good grasp of these concepts	Some grasp of these concepts	Little grasps of these concepts
Predict the outcomes of economic policies using econometric methods (15%)	Excellent application of learned materials to data	Good application of learned materials to data	Knows some application of learned materials to data	Little knowledge on the application of learned materials to data

Rubric for Presentation (30%)

Learning Outcome	Excellent A-, A	Good B- to B+	Acceptable C- to C+	Poor D or below
Understand basic principles, concepts, and theories in econometrics (20%)	Extremely logical and very appealing organization that is easy to understand; drawing interest from classmates; clear voice; correct pronunciations; enthusiastic tone; positive image with upright posture; lively gestures; uses tools (slides/ handouts/ props) in an excellent manner	Logical and appealing organization that is easy to understand; drawing interest from classmates; clear voice; correct pronunciations; enthusiastic tone; positive image with upright posture; lively gestures; effectively uses tools (slides/ handouts/ props)	Reasonable organization that is understandable; keeping classmates attentive; clear voice; mostly correct pronunciations; positive tone and image; some appropriate gestures; suitably uses tools (slides/ handouts/ props)	Organization that is difficult to understand; losing interest from classmates; unclear voice; many incorrect pronunciations; passive tone; negative image; no or inappropriate gestures; fails to or inappropriately use tools (slides/ handouts/ props)

Rubrics for Tutorial Participation (10%)

<u>Dimenions</u>	Excellent A-, A	Good B- to B+	Fair C- to C+	Pass D, D+	Failure F
Participation (5%)	Frequently raises good questions and/or eagerly responds to questions	Often raises good questions and/or eagerly responds to questions	Occasionally raises questions and/or responds to questions	Rarely raises questions and/or responds to questions	Fails to fulfill satisfactory attendance