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## **COURSE SYLLABUS**

### **FOR FULL-TIME UNDERGRADUATE PROGRAMS**

*(Issued under Decision No.1380/QĐ-ĐHKTQĐ on 15/8/2016 by the University President)*

#### **1. COURSE NAME:** Econometrics I (Applied Mathematics in Economics Major)

Code: TOTKT1127

Number of Credit: 03

#### **2. DEPARTMENT IN CHARGE OF INSTRUCTION:** Mathematical Economics

**Office:** Room 403, Bld 7

**Office Hours:** 14h-17h Friday

**Office Telephone:** 084.36283007

#### **3. PRE-REQUISITE:**

Microeconomics, Macroeconomics and Probability and Statistics

#### **4. COURSE DESCRIPTION:**

This course introduces the basic regression analysis. Apart from the preamble, it consists of 8 chapters covering the following topics: What is a regression model, the main assumptions for a regression model; model estimation and testing; and how to make statistical inferences based on estimated results. The first five chapters are for models with cross-sectional data. Regression models for time series data are presented in the last two chapters. During the course, many practical examples will be introduced for illustrative purposes; and students will learn how to conduct the analysis in Eviews. Knowledge in Mathematics and Statistics will be provided at a relevant level to ensure the scientific foundation for the course.

#### **5. COURSE OBJECTIVES:**

By the end of the course, students should:

- Have solid knowledge about the ideas of regression analysis
- Be able to conduct a complete procedure in regression analysis, from building a relevant model to using it in making conclusions and recommendation
- Master computer skills in using Eviews software to implement the above analysis

## 6. COURSE CONTENTS:

### TENTATIVE SCHEDULE

<i>No</i>	<i>Contents</i>	<i>Total hours</i>	<i>In details</i>		<i>Notes</i>
			<i>Theory</i>	<i>Practice, Discussion, Exams</i>	
1	Chapter 1	8	6	2	<i>Need a projector</i>
2	Chapter 2	8	6	3	
3	Chapter 3	6	4	2	
4	Chapter 4	4	3	1	
5	Chapter 5	8	6	2	
6	Chapter 6	6	4	2	
7	Chapter 7	5	3	3	
	<b>Total</b>	<b>45</b>	<b>30</b>	<b>15</b>	

### INTRODUCTION

This part introduces the content of the course, focusing on: the main objective of regression analysis; methodology and procedure in regression analysis; and types of data in regression analysis.

#### CHAPTER 1: SIMPLE REGRESSION MODELS

This chapter introduce linear models with two variables, indicating the relationship between one dependent and one independent variable. The aim of the chapter is to present basic ideas of regression analysis; idea and technique of OLS method as well as assumptions made in the model

- 1.1. Models and concepts
- 1.2. The OLS method
- 1.3. Unbiasness and preciseness of OLS estimators
- 1.4. The relevance of regression models
- 1.5. Some other issues

Readings:

- 1. Nguyen Quang Dong, Nguyen ThT Minh, 2012, Econometrics, NEU Press, Chapter1
- 2 - Wooldrige, 2009, Introductory econometrics: a modern approach, McGraw-Hill, Chapter 1.

## **CHAPTER 2: MULTIVARIATE REGRESSION MODELS**

This chapter introduces multivariate regression models, which is a direct generalization of the models in chapter 1. The content of chapter 1 will be expressed in a more general form in this chapter. Chapter 2 also introduces different forms of regression models and considers the larger sample size properties of OLS estimators., Regression analysis in matrix language is presented at the end of the chapter.

- 2.1. The necessity of regression models
- 2.2. Multivariate models and the method of OLS
- 2.3. Some forms of regression models
- 2.4. The consistency of OLS estimators
- 2.5. Regression models using matrix

Readings:

- 1 - Nguyen Quang Dong and Nguyen Thị Minh, 2012, Econometrics, NEU publisher, Chapter2
- 2 - Wooldrige, 2009, Introductory econometrics: a modern approach, McGraw-Hill, chapter 1.
- 3 - Damodar N. Gujarati, 2003, Basic Econometrics, fourth Edition, McGraw-Hill, phụ lục

## **CHAPTER 3 – STATISTICAL INFERENCE AND FORECATING**

Chapter 3 presents the statistical inferences: using estimated results to make inferences about the population regression coefficients. Specifically, it covers problems for confidence intervals and hypothesis testing for the coefficients.

- 3.1. Distribution of several sample statistics
- 3.2. Confidence interval for population coefficients
- 3.3. Hypothesis testing about population coefficients
- 3.4. Some other testings
- 3.5. Forecasting the dependent variable and forecast error

References of the chapter:

- 1 - Nguyen Quang Dong and Nguyen Thị Minh, 2012, Econometrics, NEU Press, Chapter 3
- 2 - Nguyen Quang Dong, 2001, Econometrics, Science and technology Press

## **CHAPTER 4 – REGRESSION MODEL WITH QUALITATIVE VARIABLES**

In many cases, a variable in economics may depend not only on quantitative factors but also on qualitative ones. This chapter will consider models in which impact of qualitative factors on the dependent variable is the focus.

- 4.1. Dummy variable - concepts
- 4.2. Model with explanatory variables are dummy
- 4.3. Model with interactive terms
- 4.4. Qualitative variables with more than two categories.

Reading materials:

- 1 - Nguyen Quang Dong, Nguyen Thi Minh, 2012, Econometrics, NEU Press, Chapter 4
- 2 - Nguyen Quang Dong, 2001, Econometrics, Science and technology Press

## **CHAPTER 5 – DIAGNOSTICS AND MODEL SELECTION**

OLS estimates are the best and statistical inferences are valid only when assumptions listed in chapter 3 are satisfied. Then what happens if one (or some) of them are not held, and what can we do then? Chapter 5 will answer this question.

- 5.1. Non-zero mean of the error term
- 5.2. Heteroskedasticity
- 5.3. Normality of the error term
- 5.4. Multicollinearity
- 5.5. The inclusion of irrelevant variables.

Reading materials:

- 1 - Nguyen Quang Dong, Nguyen Thi Minh, 2012, Econometrics, NEU Press, Chapter 5
- 2 - Nguyen Quang Dong, 2001, Econometrics, Science and technology Press

## **CHAPTER 6 – REGRESSION MODELS WITH TIME SERIES**

This chapter presents models with time series data. One important difference between time series data and cross sectional data is that while cross-sectional data are often collected in a random manner, time series are often statistically dependent from one another. This chapter will present the assumptions that ensure the validity of OLS estimates when working with time series data.

- 6.1. Time series data - concepts
- 6.2. Regression model with time series
- 6.3. Some basic regression models with time series
- 6.4. OLS's large sample properties

Reading materials:

- 1 - Nguyen Quang Dong and Nguyen Thị Minh, 2012, Econometrics, NEU Press, Chapter 6
- 2 - Wooldridge, 2009, Introductory econometrics: a modern approach, McGraw-Hill

## **CHAPTER 7 – AUTOCORRELATION IN REGRESSION MODELS WITH TIME SERIES**

Autocorrelation is what we often have to deal with when working with time series. Chapter 7 will consider its consequences, how to detect and how to cure the problem of autocorrelation

- 7.1. Consequences of autocorrelation
- 7.2. How to detect autocorrelation
- 7.3. How to cure autocorrelation

Reading materials:

- 1 - Nguyen Quang Dong, Nguyen Thị Minh, 2012, Econometrics, NEU Press, Chapter 5
- 2 - Nguyen Quang Dong, 2001, Econometrics, Science and technology Press, Chapter 7

### **7. TEXTBOOKS**

**Nguyen Quang Dong and Nguyen Thị Minh, 2012, Econometrics, NEU Press.**

### **8. RECOMMENDED TEXTS & OTHER READINGS**

### **9. ASSESSMENT & GRADING POLICY:**

- Band score: 10 and 4.0
- In which:
  - + Class participation: 10%
  - + Midterm test: 30%
  - + Final Exam: 60%
- Compulsory: attend at least 80% of the class + take the midterm test

*Hanoi, 2016*

**HEAD OF DEPARTMENT**

(signed)

**PhD. Nguyen Manh The**

**PRESIDENT**

(signed)

**Prof.Dr. Tran Tho Dat**