

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: Analysis of Socio-Economic Data

Code: TKKT1107

Number of Credits: 02

2. DEPARTMENT IN CHARGE OF INSTRUCTION:

Socio-Economic Statistics

Office: Room 401-402, Building No 7, NEU

Office Hours: 8:00 – 17:00, from Monday to Friday

Office Telephone: 04.38693275

3. PRE-REQUISITE:

Advanced Mathematics, Probability and Statistics

4. COURSE DESCRIPTION:

Analysis of Socio-Economic Data course presents methods for managing and analysing large data sets. The course focuses on multivariate analysis techniques to analyse qualitative data (a common type of data in social area) and time series data. Results of data analysis provide scientific evidence for decision-making and forecasting at the macro and micro level.

5. COURSE OBJECTIVES:

This course equips students with multivariate analysis techniques to investigate relationships and forecast that serve decision making. At the end of the course, students will understand mechanism under multivariate statistical techniques and use in practice of multivariate statistical soft-ware.

6. COURSE CONTENT:

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	6	4	2	
2	Chapter 2	6	4	2	
3	Chapter 3	6	4	2	
4	Chapter 4	5	4	1	
5	Chapter 5	6	4	2	
6	Mid-term exam	1		1	
	Total	30	20	10	

CHAPTER I – Principal Components Analysis

Principal Components Analysis (PCA) is one of the basic methods of multivariate analysis techniques. In socio-economics, many concepts are multidimensional, which are measured by several indicators. PCA is able to build an index from indicators that allow to reduce dimensions of original data. This method can be applied for ordinal and scale data. The technique is described carefully in this chapter.

1.1. Principles of PCA

1.1.1. Introduction to PCA

1.1.2. Structure of data in PCA

1.1.3. Applicable areas

1.2. Steps of PCA

1.2.1. Selection of variables

1.2.2. Choosing the number of components

1.2.3. Rotation

1.2.4. Interpretation of components and factor scores

1.3. Examples

Texts and readings for the chapter:

1. D.A. de Vaus (2002). Surveys in Social Research (5th edition). Allen & Unwin.
2. E. Mooi and M. Sarstedt (2011), A concise guide to market research (1st Edition), Springe.
3. Ajit C. Tamhane and Dorothy D. Dunlop (2000). Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall.

4. Hastie et al. (2009). The Elements of Statistical Learning: Data mining, Inference, and Prediction, 2nd edition. Springer.

CHAPTER II – MULTIPLE CORRESPONDENCE ANALYSIS

Multiple Correspondence Analysis (MCA) has become popular because the technique can analyse qualitative data which are common in social researches. While PCA is considered as the data reduction technique for quantitative data, MCA is the data reduction technique for qualitative data. This chapter presents the method of MCA and data structure for this technique.

2.1. Correspondence analysis

- 2.1.1. Objective of the method
- 2.1.2. Data and structure of data
- 2.1.3. Steps to analyse correspondence analysis

2.2. Multiple correspondence analysis

- 2.2.1. Data and data structure
- 2.2.2. Steps to analyse multiple correspondence analysis
 - 2.2.2.1. *Calculating statistics*
 - 2.2.2.2. *Deciding how many components to retain*
 - 2.2.2.3. *Graphical presentation*

2.3. Examples

Texts and readings for the chapter:

1. Ajit C. Tamhane and Dorothy D. Dunlop (2000). Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall.
2. Hastie et al. (2009). The Elements of Statistical Learning: Data mining, Inference, and Prediction, 2nd edition. Springer.
3. ALVIN C. RENCHER, Methods of Multivariate Analysis, Second Edition, Brigham Young University, A JOHN WILEY & SONS, INC. PUBLICATION.
4. Wolfgang Hardle Leopold Simar, Applied Multivariate Statistical Analysis, Version: 29th April 2003
5. Johnson R.A., and Wichen, W.W (2007). Applied multivariate statistical analysis (sixth edition). Pearson Prentice Hall.
6. M. Hoy et al. (2011). Mathematics for economics (3rd edition). The MIT press, Cambridge, Massachusetts, London, England.
7. Alvin C. Rencher. Method of Multivariate Analysis (second edition). John Wiley and Sons, INC. Publication.
8. E. Mooi and M. Sarstedt (2011). A concise guide to market research (1st Edition), Springe.
9. Michael Greenacre and Jorg Blasius (2006). Multiple Correspondence Analysis and Related Methods. Chapman & Hall/CRC.

CHAPTER III – CANONICAL CORRELATION ANALYSIS

The needs to analyse the correlation between two sets of variables are increasing in socio-economic researches. While regression technique investigates the impact of several independent variables on one dependent variable, Canonical Correlation Analysis (CCA) characterises the linear relationship between two sets of quantitative variables. CCA allows to identify and quantify impacts of a set of independent variables on a set of dependent variables. The technique is presented in this chapter.

3.1. Introduction

3.1.1. Canonical correlation and canonical covariates

3.1.2. Properties of canonical correlation

3.2. Steps to analyse CCA

3.2.1. Example

3.2.2. Test of significance

3.2.3. Interpretation

3.3. Example of CCA with a large data set

Texts and readings for the chapter:

1. Ajit C. Tamhane and Dorothy D. Dunlop (2000). Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall.
2. ALVIN C. RENCHER, Methods of Multivariate Analysis, Second Edition, Brigham Young University, A JOHN WILEY & SONS, INC. PUBLICATION.
3. Wolfgang Hårdle Léopold Simar, Applied Multivariate Statistical Analysis, Version: 29th April 2003
4. Johnson R.A., and Wichin, W.W (2007). Applied multivariate statistical analysis (sixth edition). Pearson Prentice Hall.
5. E. Mooi and M. Sarstedt (2011). A concise guide to market research (1st Edition), Springe.
6. Michael Greenacre and Jorg Blasius (2006). Multiple Correspondence Analysis and Related Methods. Chapman & Hall/CRC.

CHAPTER IV – TIME SERIES ANALYSIS

Time series analysis is a common technique to analyse the relationship of time series such as GDP, inflation, unemployment, ... and forecast. A time series is eligible for being analysed once values at each point of time of a time series are comparable. This chapter provides descriptive techniques to explore a time series and make values of a time series comparable. The chapter, then, presents regression models to investigate the relationship of time series. Autoregressive Distributed Lag (ARDL) model is also presented in this chapter.

4.1. Time series

4.1.1. Properties of a time series

4.1.2. Components of a time series

- 4.1.3. time chart
- 4.1.4. Making a time series comparable
- 4.2. Analysing relationship of time series**
 - 4.2.1. Properties of time series relationship
 - 4.2.2. Linear regression
 - 4.2.3. Some common regression models
- 4.3. ARDL model**
 - 4.3.1. VAR model
 - 4.3.2. ARDL model
- 4.4. Example**

Texts and readings for the chapter:

1. PGS.TS. Trần Ngọc Phác, TS. Trần Thị Kim Thu (2006), Lý thuyết thống kê, NXB Thống kê [Theory of Statistics. Textbook, Statistical Publishing House]
2. PGS.TS Trần Thị Kim Thu (2011), Lý thuyết thống kê, NXB Đại học Kinh tế quốc dân [Theory of Statistics. Textbook, National Economics Publishing House]
3. GS.TS. Nguyễn Quang Dong, PGS.TS. Nguyễn Thị Minh, Giáo trình Kinh tế lượng, NXB ĐHKTD, 2012 [Econometrics, Textbook, National Economics Publishing House]
4. Chris Chatfield, The analysis of time series : an introduction, Chapman and Hall/CRC, 2003.

CHAPTER V – FORECASTING

The objective of time series analysis is to describe a time series, analyse the relationship and forecast. This chapter starts with a time-plot and correlogram to identify the trend, turning points, outliers of a time series, and the auto-correlation of a time series. The chapter, then, continues with the presentation of forecasting models. The selection of appropriate forecasting models is also described.

5.1. Descriptive technique

- 5.1.1. Time plot
- 5.1.2. Correlogram

5.2. Forecasting

- 5.2.1. Basic concept
- 5.2.2. The Box-Jenkins forecasting model

5.3. Examples

Texts and readings for the chapter:

1. GS. TS. Phạm Ngọc Kiểm (2002). Giáo trình Phân tích kinh tế xã hội. Nhà xuất bản thống kê [Socio-economic analysis. Textbook, Statistical Publishing House]

2. PGS.TS. Trần Ngọc Phác, TS. Trần Thị Kim Thu (2006), Lý thuyết thống kê – Chương 2, NXB Thống kê [Theory of Statistics, chapter 2. Textbook, Statistical Publishing House]
3. PGS.TS Trần Thị Kim Thu (2011), Lý thuyết thống kê – Chương 2, NXB Đại học Kinh tế quốc dân [Theory of Statistics, chapter 2. Textbook, National Economics Publishing House]
4. Jonathan D.Cryer (1986). Time series analysis. PWS-KENT.
5. Chris Chatfield (1995). The Analysis of time series: an introduction. (Fifth edition). Chapman & Hall/CRC.
6. G.E.P. Box and G.M. Jenkins (1970). Time series analysis: forecasting and control. San Francisco.

7. REQUIRED TEXTBOOKS & COURSE MATERIALS:

Lecture notes

8. RECOMMENDED TEXTS & OTHER READINGS:

1. GS. TS. Phạm Ngọc Kiêm (2002). Giáo trình Phân tích kinh tế xã hội. Nhà xuất bản thống kê [Socio-economic analysis. Textbook, Statistical Publishing House]
2. PGS.TS. Trần Ngọc Phác, TS. Trần Thị Kim Thu (2006), Lý thuyết thống kê – Chương 2, NXB Thống kê [Theory of Statistics. Textbook, Statistical Publishing House]
3. PGS.TS Trần Thị Kim Thu (2011), Lý thuyết thống kê – Chương 2, NXB Đại học Kinh tế quốc dân [Theory of Statistics. Textbook, National Economics Publishing House]
4. GS.TS. Nguyễn Quang Đông, PGS.TS. Nguyễn Thị Minh, Giáo trình Kinh tế lượng, NXB ĐHQG, 2012 [Econometrics, Textbook, National Economics Publishing House]
5. Ajit C. Tamhane and Dorothy D. Dunlop (2000). Statistics and Data Analysis: From Elementary to Intermediate. Prentice Hall.
6. Hastie et al. (2009). The Elements of Statistical Learning: Data mining, Inference, and Prediction, 2nd edition. Springer.
7. Wolfgang Härdle Leopold Simar, Applied Multivariate Statistical Analysis, Version: 29th April 2003
8. Johnson R.A., and Wichern, W.W (2007). Applied multivariate statistical analysis (sixth edition). Pearson Prentice Hall.
9. Alvin C. Rencher. Method of Multivariate Analysis (second edition). John Wiley and Sons, INC. Publication.
10. E. Mooi and M. Sarstedt (2011). A concise guide to market research (1st Edition), Springer.
11. Michael Greenacre and Jörg Blasius (2006). Multiple Correspondence Analysis and Related Methods. Chapman & Hall/CRC.

12. J. Scott Long (1997). Regression models for categorical and limited dependent variables. SAGE Publications, International Educational and Professional Publisher.
13. Marno Verbeek (2002). A guide to modern econometrics. John Wiley & Sons, LTD.
14. Jeffrey M. Wooldridge (2003). Introductory econometrics. Thomson South Western.
15. Jonathan D. Cryer (1986). Time series analysis. PWS-KENT.
16. Chris Chatfield (1995). The Analysis of time series: an introduction. (Fifth edition). Chapman & Hall/CRC.
17. G.E.P. Box and G.M. Jenkins (1970). Time series analysis: forecasting and control. San Francisco.

9. ASSESSMENT & GRADING POLICY:

The assessment and grading policy complies with the current regulations of the National Economics University. Specifically:

- Class attendance: 10%
- Mid-term exam: 30%
- Final exam: 60%

(To be eligible for final exam, students need to achieve minimum scores of 5 and 3 for attending class and mid-term exam, respectively)

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

MSc. Nguyen Thi Xuan Mai

Prof.Dr. Tran Tho Dat