

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: Multivariate Statistical Analysis 1

Code: TOKT1109

Number of Credit: 03

2. DEPARTMENT IN CHARGE OF INSTRUCTION

Office: Faculty of Mathematics for Economics

Office Hours: Working hours, the working day

Office Telephone: 084 38263007

3. PRE-REQUISITE

Mathematical Statistics, Econometrics 1

4. COURSE DESCRIPTION

This module provides specialized knowledge for training programs in Applied Mathematics in social economics. This is the next module in the training process after Mathematical Statistics modules. The two main blocks of knowledge involve:

The methods of describing, evaluating data and multivariate statistical analysis, especially non-parametric analysis.

Empirical analysis with data in Vietnam, the World and the region and theoretical knowledge of samples and sample surveys.

5. COURSE OBJECTIVES

By the end of this module students should acquire the knowledge and skills as to:

- Understand the methodology of socio-economic research with statistical models
- Understand the theoretical basis of formation and solving problems multivariate statistical analysis
- Understand the scope and conditions of use of the models and methods of analysis
- Good analytical skills with the statistical model and using specialized softwares

- Gain deeper understanding of the socio-economic situation of Vietnam and possibilities and ways to use the statistical analysis model through the use of empirical data sets Vietnam

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	4	4	0	<i>Students need to practice more on the computer</i>
2	Chapter 2	6	4	2	
3	Chapter 3	8	4	4	
4	Chapter 4	8	5	3	
5	Chapter 5	8	6	2	
6	Chapter 6	11	6	4+1	
	Total	45	29	16	

CHAPTER 1– BASIC PROBLEMS STATISTICS PRACTICE

Introducing methods of approaching statistical models in social and economic research. The selection of models and supporting softwares.

1.1. Statistical Sciences and Mathematical Methods

1.2. The basic problems of statistical practice

1.2.1. Population and individual statistics

1.2.2. Random samples

1.2.3. Sources of information and create information resources

1.2.4. Statistical Description

1.2.5. Statistical analysis on the different data

1.2.6. Multivariate statistical analysis and non-parametric analysis

1.2.7. Statistical analysis with no observable criteria

1.2.8. Statistical software selection

1.3. Mathematical modeling and selection of analytical methods

1.3.1. The basic advantages when statistical analysis by modeling

1.3.2. Selection of analytical methods

References

1 - Ngo Van Thu, 2015, Textbook practice statistics, NEU, Chapter 1.

2 - Hoang Dinh Tuan, 2010, Theory econometric model, Science and Technology Publishing House, Chapter 1.

3 - Nguyen Quang Dong, 2008, Econometrics, Science and Technology Publishing House, Chapter 1.

4 - Thomas H.Wonnacott, Ronald J. Wonnacott, 1990, for business and economics Introductory statistis, Chapter 1.

CHAPTER 2 - METHODS OF SAMPLE AND THEORY SAMPLE SURVEY

This chapter introduces how to analyze data with different sampling methods, the theoretical basis and the conditions of use of the sampling method, the method of determining the sample size in different situations. It also outlines the theory of questionnaires and how to organize a survey on the perspective of searching information for statistical modeling.

2.1. A summary of sample method

2.2. basic problems of sample surveys

2.3. The sampling method

2.3.1. Some basic principles

2.3.2. Methodology and selection criteria

2.3.3. Determination of sample size

2.3.4. Different sampling methods

2.4. Theoretical Summary questionnaire

2.4.1. Establishing the basis of the questionnaire

2.4.2. Classification of questionnaires

2.4.3. Structured questionnaires and types of questions

References

1 - Ngo Van Thu, 2015, Statistics Practice Curriculum, National Economic Publishing House, Chapter 2.

2 - Nguyen Minh Thang, 1987, Survey Sampling, Statistical Publishing House.

3 - Nguyen Quang Dong, 2008, Econometrics, Science and Technology Publishing House, Chapter 1.

4 - Giuseppe Iarrossi, 2006, The power of survey design, National Political Publishing House.

5 - Douglas A, Lind, William G.Marxhal, Robert D.Mason, 2001 in Business & Economics Statisstical Techniques, McGraw-Hill, Chapter 1.

6 - Thomas H.Wonnacott, Ronald J. Wonnacott, 1990, for business and economics Introductory statistis, Chapter 6.

CHAPTER 3 - DESCRIPTIVE STATISTICS

This chapter introduces tools for descriptive statistics targeting at synthesizing and detecting problems in service of statistical modeling and statistical analysis methods. It focuses more on multivariate statistical description with the meaning of these characteristics. It also explores the relationships described to evaluate statistical data.

3.1. Statistical description with 1 variable 3.1.1. Descriptive statistics using characteristics 3.1.2. Descriptive statistics using frequency tables, frequency

3.1.3. Descriptive statistics by standardizing variables (Z) (Reference)

3.1.4. Descriptive statistics with characteristic statistical correction and standardization of data

3.2. Concurrent and group description 3.2.1. Concurrent description with the contingency table

3.2.2. Relations description

3.2.3. group description

3.3. Descriptive statistics with charts

3.3.1. Point scattered charts (point cloud)

3.3.2. Line graph - point spread

3.3.3. Column charts

3.3.4. Pie charts

3.3.5. Box charts box and individual values

3.3.6. Stem and leaf Charts

3.3.7. Spider charts (radar)

3.3.8. ROC charts

3.4. Testing, evaluating and cleaning up sample data

3.4.1. Testing logic and sample characteristics

3.4.2. Testing the reliability of data

Appendix 1: Summary of SPSS for Windows and STATA

1. Stata version 7.0 for Windows

2. SPSS for windows

3. SPSS with descriptive statistics

1 - Ngo Van Thu, 2015, The statistical practice Curriculum, NEU, Chapter 3.

2 - Nguyen Cao Van, Tran Thai Ninh, and Ngo Van Thu, 2011, The theory of probability and mathematical statistics, NEU, Chapter 7.

3 - Douglas A, Lind, William G.Marxhal, Robert D.Mason, 2001 in Business & Economics Statisstical Techniques, McGraw-Hill, Chapter 2-4.

4 - Thomas H.Wonnacott, Ronald J. Wonnacott, 1990, for business and economics Introductory statistis, Chapters 2-5.

CHAPTER 4 - ANALYSIS OF VARIANCE

This chapter introduces overall model analysis of variance, methods of analysis and data processing skills for the analysis of variance model. It also presents the use of softwares in solving problems with the analysis of variance with full, detailed tests in various cases.

4.1. Model analysis of variance - factor analysis

4.1.1. Problem analysis of variance

4.1.2. Common methods

4.2. Analysis of variance an effective factor identified

4.2.1. Theoretical model

4.2.2. The types of data analysis and technical variance calculation

4.2.3. Regression model analysis of variance

4.2.4. Kruskal-Wallis test the

4.2.5. Pairwise comparisons

4.3. Analysis of variance effectively a random factor

4.3.1. Model

4.3.2. Technical testing and analysis

4.4. Analysis of variance of two factors determine efficiency

4.4.1. Model analysis of variance of two factors separate impact

4.4.2. Technical testing and analysis

4.4.3. Model analysis of variance of two factors acting simultaneously

4.5. SPSS and STATA with analysis of variance

4.5.1. Analysis of variance 1 factor

4.5.2 Analysis of variance of many factors

References

1 - Ngo Van Thu, 2015, The statistical practice, NEU, Chapter 4.

2 - Nguyen Cao Van, Tran Thai Ninh, and Ngo Van Thu, 2011, The theory of probability and mathematical statistics, NEU, Chapter 11

3 - Thomas H. Wonnacott, Ronald J. Wonnacott, 1990, for business and economics Introductory statistics, Chapter 10.

4 - Douglas A. Lind, William G. Marxhal, Robert D. Mason, 2001, Statistical Techniques in Business & Economics, McGraw-Hill Chapter 12

CHAPTER 5 - INSPECTION OF NON PARAMETERS

This chapter introduces a model class of non-parametric tests. This program focuses on the application of the theory to solving common problems in practice rather than the theory itself.. Its priority is to take advantage of the specialized softwares to create analytical skills.

5.1. Criterion of the Chi-squares

5.1.1. Testing the fit of experimental rules

5.1.2. Testing the independence of two signs

5.1.3. Testing marks (sign tests)

5.2. The normal distribution test (reference)

5.2.1. Standard Kolmogorov

5.2.2. Standard Jacque- Bera

5.3. The test on the basis of rank correlation

5.3.1. Wilcoxon test

5.3.2. Spearman rank correlation test

5.3.3. Mann-Whitney test

5.3.4. Testing is based on the correlation coefficient Kendall

5.3.5. Inspection of Friedman's k homogeneous sample

5.4. Stata with the non-parametric tests

5.4.1. The class-based testing

5.4.2. Criterion Chi-squared

5.5. SPSS with non-parametric tests

5.5.1. Chi Square

5.5.2. Binomial procedures

5.5.3. Runs Test Procedures

5.5.4. K-S test procedures

5.5.5. Testing of the independence of two samples (two samples Independent)

5.5.6. Testing k independent samples (k Independent samples)

5.5.7. Testing bivariate correlations (2 Relation samples)

5.5.8. Testing variable relations k (k Relation samples)

References of the chapter:

1 - Ngo Van Thu, 2015, The statistical practice, NEU, Chapter 5.

2 - Nguyen Cao Van, Tran Thai Ninh, and Ngo Van Thu, 2011, the theory of probability and mathematical statistics, NEU, Chapter 7

3 - Thomas H.Wonnacott, Ronald J. Wonnacott, 1990, for business and economics Introductory statistis, chapter 16.

4 - Douglas A, Lind, William G.Marxhal, Robert D.Mason, 2001 in Business & Economics Statisstical Techniques, McGraw-Hill, Chapter 15.

CHAPTER 6 - RECOVERY PROCESS AND RELATIONSHIPS

This chapter focuses on the correlation analysis, partial correlation and partial correlation. The content regression is presented as a different approach than econometrics from statistical perspective, serving as the basis for the correlation analysis. Conversely, correlation analysis clarifies the meaning of the regression analysis.

6.1. Linear regression model

6.1.1. Definition and classification

6.1.2. Single regression, regression empirical and regression estimates

6.1.3. Multiple regression and matrix method

6.1.4. Method of least squares and perpendicular projection

6.1.5. Estimates and regression testing of samples

6.1.6. Examples and analysis

6.1.7. Regression with dependent variable is qualitative variables

6.2. Correlation Analysis

6.2.1. With two random variables

6.2.2. With many random variables - partial correlation coefficient

6.2.3. Partial correlation coefficients

6.2.4. The correlation coefficients of the variables in the linear regression

6.3. Regression analysis and correlation with SPSS and STATA

6.3.1. Regression Analysis with SPSS

6.3.2. Some basic techniques and examples

6.3.3. Correlation Analysis with SPSS

6.3.4. Regression Analysis with STATA

References of the chapter:

1 - Agresti, Alan, 2007, An introduction to categorical data analysis, ISBN 978-0-471-22618-5. A John Wiley & Sons.

2 - Allen Webster, 1992, Applied Statistics for Business and Economics, 1992 Irwin.

3 - Dale J. Poirier, 1995, Intermediate statistics and Econometrics.

4 - J.K. Lindsey, 2007, Generalized Linear Models Applying, Limburgs Universitair Centrum, diepenbeek.

5 - K.M. Ramachandran, Chris P. Tsokos, 2009, Mathematical statistics with Application. Elsevier, Chapter 8.

6 - Russell Davidson, James G. MacKinnon, 1993, Estimation and inference in econometrics, Oxford University.

7 - S. Moore, P. McCabe, A. Craig, 2009, Introduction to the Practice of Statistics, Freeman W-H, Chapter 10, 11, 14

8 - Thomas H. Wonnacott, Ronald J. Wonnacott, 1990, statistics for business and economics Introductory, Wiley, Chapter 11-15.

9 - Ngo Van Thu, 2015, The statistical practice, Publishing NEU, Chapter 6.

- 10- Nguyen Quang Dong, 2002, Advanced Econometrics, Published KHTK.
- 11 - Nguyen Cao Van, Tran Thai Ninh, and Ngo Van Thu, 2011, the Curriculum Theory of Probability and Statistics, Published NEU.

7. REQUIRED TEXTBOOK & COURSE MATERIALS

- 1 - Ngo Van Thu, 2015, the statistical practice, NEU
- 2 - Database (as required by the lecturer)
- Survey data 2002-2004-2006-2008 Living Standards
 - Enterprise Survey data 2000-2009
 - Data on the stock market from 2000 to 2010.
 - Data on a number of thematic surveys.
- 3- Statistical softwares: SPSS, STATA, EXCEL

8. RECOMMENDED TEXTS & OTHER READINGS

- 1 - Agresti, Alan, 2007, An introduction to categorical data analysis, ISBN 978-0-471-22618-5. A John Wiley & Sons.
- 2 - Allen Webster, 1992, Applied Statistics for Business and Economics, 1992 Irwin.
- 3 - Dale J. Poirier, 1995, Intermediate statistics and Econometrics.
- 4 - Douglas A. Lind, William G. Marzhal, Robert D. Mason, 2001 in Business & Economics Statistical Techniques, McGraw-Hill.
- 5 - J.K. Lindsey, 2007, Generalized Linear Models Applying, Limburgs Universitair Centrum, diepenbeek.
- 6 - K.M. Ramachandran, Chris P. Tsokos, 2009, Mathematical statistics with Application. Elsevier, Chapter 8.
- 7 - Russell Davidson, James G. MacKinnon, 1993, Estimation and inference in econometrics, Oxford University.
- 8 - S. Moore, P. McCabe, A. Craig, 2009, Introduction to the Practice of Statistics, Freeman W-H, Chapter 10, 11, 14
- 9 - Thomas H. Wonnacott, Ronald J. Wonnacott, 1990, statistics for business and economics Introductory, Wiley, Chapter 11-15.
- 10 - Le Van Phong, Tran Trong Nguyen, 2011, Theory of Probability.
- 11 - Nguyen Minh Thang, 1987, Survey Sampling, Statistical Publishing House.
- 12 - Hoang Dinh Tuan, 2010, Mathematical Economic, Science and Technology Publishing House.
- 13 - Ngo Van Thu, 2015, the statistical practice, NEU, Chapter 6.
- 14- Nguyen Quang Dong, 2002, Advanced Econometrics, Published KHTK.
- 15 - Nguyen Cao Van, Tran Thai Ninh, Ngo Van Thu, 2011, the Curriculum Theory of Probability and Statistics, NEU.

9. ASSESSMENT & GRADING POLICY

- Scale (point) : 10
- Structure of points:
 - + Discussion point: 10%
 - + The exercise, check out: 30%
 - + The final examination period: 60%
- Conditions of the final exam:
 - + Must attend at least 80% of the course

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

PhD. Nguyen Manh The

Prof.Dr. Tran Tho Dat