

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: THEORY OF STATISTICS 2

Code: TKKD1102

Number of Credit: 3

**2. DEPARTMENT IN CHARGE OF INSTRUCTION: Business Statistics
Department**

Office: Room No.401 – Block 7 – National Economics University

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

Office Telephone: 04.38693275

3. PRE-REQUISITE:

- *Mathematics for Economics 1, Mathematics for Economics 2*
- *Probability and Mathematical Statistics*
- *Theory of statistics 1*

4. COURSE DESCRIPTION:

Theory of statistics provides learners with the statistical theory and methods. It provides the basic concepts in statistics, survey methods, methods of data processing and presenting the statistical results. The course content consists of 11 chapters, divided into two modules. Part I covers chapter 1 to chapter 6, Part II covers chapter 7 to chapter 11. Theory of Statistics 2 presents methods of socio-economic analysis including analyzing the relationship by regression and correlation, index number; analysis of the phenomenon changes over time; the statistical prediction methods.

5. COURSE OBJECTIVES:

After completing the course, students need to achieve the following knowledge and skills:

- Skills on methods regression analysis and correlation analysis to express the relationship between these phenomena with the specific conditions.
- Skills of analysing the characteristics and regularity of the phenomenon fluctuations over time, analyzing the elements (components) that make up the volatility.

- Mastering the index number method. Understanding some common indicators in reality such as consumer prices index, industrial production index ...
- Understand and master some statistical prediction methods commonly used in business administration and socio-economic management.

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 7	9	6	3	
2	Chapter 8	9	6	3	
3	Chapter 9	10	7	3	
4	Chapter 10	9	6	3	
5	Chapter 11	7	5	2	
6	Mid-course test	1		1	
	Total	45	30	15	

CHAPTER 7 – CORRELATION AND REGRESSION

Managers often make decisions by studying the relationship between variables, and progress improvement can often be made by understanding how changes in one or more variables affect the progress output. Regression analysis is used to predict the value of one variable on the basis of other variables. If we are interested only in determining whether a relationship exists, we employ correlation analysis. Because regression analysis involves many techniques and concepts, we divided the content into two part presented in two chapters. This chapter presents the techniques that allow us to determine the relationship between only two variables.

7.1. General concept

7.1.1. Types of relationship

7.1.2. The task and meaning

7.2. Simple linear regression and correlation

7.2.1. Statistical model for linear regression

7.2.2. The coefficient of Correlation and detemination

7.3. Nonlinear regression and correlation

7.3.1. Statistical model for nonlinear regresstion

7.3.2. Multiple Correlation

7.4. Autocorrelation

Texts and readings for the chapter:

1. Tran Thi Kim Thu (2012), *Statistical Theory – Chapter 11*, National Economics Publishing House
2. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 7*, Statistical Publishing House
3. Institute of Statistical Science (2010), *Statistics practice (translated book)*
4. Nguyen Quang Dong (2006), *Econometrics (Advanced Program)*, Hanoi science and technology Publishing House
5. Nguyen Khac Minh (2002), *The methods of analyzing and forecasting in economics*, Hanoi science and technology Publishing House
6. Nguyen Cao Van and Tran Thai Ninh (2008), *Probability and Mathematical Statistics Theory*, National Economics University Publishing House
7. Gujarati, Damodar N (2006), *Essentials of Econometrics*, McGraw-Hill. Inc.
8. David R. Anderson, Dennis J. Sweeney (2011), Thomas A. Williams, *Statistics for business and economics*, 11th edition, South-Western, Cengage Learning.
9. Mark L. Berenson, David M. Levine, Timothy C. Krehbiel (2009), *Basic Business Statistics, Concepts and Applications*, Eleventh edition, Pearson International Edition.
10. Ken Black (2008), *Business Statistics for Contemporary Decision Making*, Fifth edition, Wiley.
11. McGraw-Hill Irwin (2002), *Complete Business Statistics*, Fifth edition

CHAPTER 8 – MULTIPLE REGRESSION

In the previous chapter, we employed the simple regression model to analyze how one variable is related to another interval variable. Although there are a number of applications where we purposely develop a model with only one dependent variable, in general we prefer to include as many independent variables as believed to affect dependent variables. Arbitrarily limiting the number of dependent variables also limits the usefulness of the model. In this chapter, we allow for any number of independent variables. In so doing, we expect to develop models that fit the data better than would a simple linear regression model.

8.1. Multiple regression model

- 8.1.1. Multiple regression equation
- 8.1.2. Coefficient of regression and standardized coefficients
- 8.1.3. Confidence interval for coefficient of regression
- 8.1.4. Coefficient of determination
- 8.1.5. Standard error of model

8.2. Multicollinearity

- 8.2.1. The effects of multicollinearity
- 8.2.2. Multicollinearity diagnostics
- 8.2.3. Treatment of multicollinearity

8.3. Autocorrelation

8.4. Regression for qualitative independence variables

8.5. Logistics regression

Texts and readings for the chapter:

1. Tran Thi Kim Thu (2012), *Statistical Theory – Chapter 12*, National Economics Publishing House
2. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 7*, Statistical Publishing House
3. Institute of Statistical Science (2010), *Statistics practice (translated version)*
4. Nguyen Quang Dong (2006), *Econometrics (Advanced Program)*, Hanoi science and technology Publishing House
5. Nguyen Khac Minh (2002), *The methods of analyzing and forecasting in economics*, Hanoi science and technology Publishing House
6. Nguyen Cao Van and Tran Thai Ninh (2008), *Probability and Mathematical Statistics Theory*, National Economics Publishing House
7. Gujarati, Damodar N (2006), *Essentials of Econometrics*, McGraw-Hill. Inc.
8. David R.Anderson, Dennis J.Sweeney (2011), Thomas A.Williams, *Statistics for business and economics*, 11th edition, South-Western, Cengage Learning.
9. Mark L. Berenson, David M. Levine, Timothy C. Krehbiel (2009), *Basic Business Statistics, Concepts and Applications*, Eleventh edition, Pearson International Edition.
10. Ken Black (2008), *Business Statistics for Contemporary Decision Making*, Fifth edition, Wiley.
11. McGraw-Hill Irwin (2002), *Complete Business Statistic*, Fifth edition

CHAPTER 9 - TIME SERIES ANALYSIS

Time series is a value series of statistical indicators which are arranged in chronological order. To analyze the characteristics of the phenomenon of volatility over time, we use five criteria analysis of the time. A time series includes four components which are trend, cyclical fluctuations, seasonal fluctuations and these components can be combined in a variety of formats. To eliminate random effects to help smooth the sequence and expression of the basic trends of the phenomenon, we use the method to expand the distance of time, the moving average and trend functions. Seasonal elements are calculated based on the seasonal index and dissection base on the pattern matching of time series' components. One of the important applications of the time series is to predict on the basis of analyzing the characteristics and composition of the time series. All the above contents are presented in this chapter.

9.1 General concept

9.2 Analysis of fluctuation characteristics

- 9.2.1. The average
- 9.2.2. Absolute increase (decrease)
- 9.2.3. The pace of development
- 9.2.4. The growth rate
- 9.2.5. Absolute value of 1% growth rate

9.3 Analysis of time series components

- 9.3.1. Trend analysis
- 9.3.2. Seasonal analysis

Texts and readings for the chapter:

1. Tran Thi Kim Thu (2012), *Statistical Theory – Chapter 3*, National Economics University Publishing House
2. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 8 and 10*, Statistical Publishing House
3. Institute of Statistical Science (2010), *Statistics practice (translated version)* – Chapter 1, Statistical Publishing House
4. Nguyen Quang Dong (2006), *Econometrics (Advanced Program)*, Hanoi science and technology Publishing House
5. Nguyen Khac Minh (2002), *The methods of analyzing and forecasting in economics*, Hanoi science and technology Publishing House
6. Jonathan D.Cryer (1986), *Time series analysis*, PWS-KENT

7. Walter Enders (2004), *Applied econometric time series*, Wiley
8. Gujarati, Damodar N (2006), *Essentials of Econometrics*, McGraw-Hill. Inc
9. David R.Anderson, Dennis J.Sweeney (2011), Thomas A.Williams, *Statistics for business and economics*, 11th edition, South-Western, Cengage Learning.
10. Mark L. Berenson, David M. Levine, Timothy C. Krehbiel (2009), *Basic Business Statistics, Concepts and Applications*, Eleventh edition, Pearson International Edition.
11. Ken Black (2008), *Business Statistics for Contemporary Decision Making*, Fifth edition, Wiley.
12. McGraw-Hill Irwin (2002), *Complete Business Statistics*, Fifth edition

CHAPTER 10: INDEX NUMBERS

Index is not only an important method but also is an effective tool in statistics as research socio-economic. This is the method of analyzing the volatility of the phenomenon through different conditions of time and space. We can also analyze the effects of the composing factors that cause the variation. In so doing, this chapter presents the details of index theory, the concept, classification, characteristics, basic index construction method and index system analytical method.

10.1. General concept

10.2. Index Calculation

10.2.1. Development index

10.2.1.1. Individual index

10.2.1.2. Composite index

10.2.2. Spatial index

10.2.2.1. Individual index

10.2.2.2. Composite index

10.3. Index system

10.3.1. General concept

10.3.2. Uninterrupted alternative method

10.3.3. Others

10.4. Some popular indice in Vietnam

10.4.1. Consumption prices Index

10.4.2. Deflation index

10.4.3. Stock index

10.4.4. Index of Industrial Production

Texts and readings for the chapter:

1. Tran Thi Kim Thu (2012), *Statistical Theory – Chapter 13*, National Economics Publishing House
2. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 8, 10*, Statistical Publishing House
3. Circular 07/2011-MPI on the application of "Industrial production index every month"
4. Nguyen Van Nam and Vuong Trong Nghia (2002), *Stock market*, Finance Publishing House.
5. Nguyen Huu Hoe (1984), *Statistical Theory*, Statistics Publishing House
6. Institute of Statistical Science (2005), *Some methodological issues statistics*, Statistics Publishing House

CHAPTER 11: STATISTICAL FORECASTING METHODS

The statistical analysis method does not only help us to research, analyse the prescriptive nature and regularity of the phenomenon but also helps us to have a basis for calculating the extent of the phenomenon in the future (Statistical prediction). This chapter covers a number of statistical prediction methods commonly used in practice, from the simple methods to more sophisticated methods in order to offer a reliability level as a basis for management decisions.

11.1. General concepts

11.2. Forecasting based on regression model

11.3. Forecasting based on time series

11.3.1. Some simple forecasting methods

11.3.2. Forecasting based on trend function and seasonal index

11.3.3. Forecasting based on exponential smoothing

11.3.4. Forecasting based on autoregression model

11.3.5. Forecasting based on moving average and ARIMA

Texts and readings for the chapter:

1. Tran Thi Kim Thu (2012), *Statistical Theory – Chapter 13*, National Economics Publishing House

2. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 9*, Statistical Publishing House
3. Nguyen Huu Hoe (1984), *Statistical Theory*, Statistics Publishing House
4. Institute of Statistical Science (2010), *Statistics practice (translated version)* – Statistical Publishing House
5. Nguyen Quang Dong (2006), *Econometrics (Advanced Program)*, Hanoi science and technology Publishing House
6. Nguyen Khac Minh (2002), *The methods of analysis and forecasting in economic*, Hanoi science and technology Publishing House
7. Jonathan D.Cryer (1986), *Time series analysis*, PWS-KENT
8. Walter Enders (2004), *Applied econometric time series*, Wiley
9. Gujarati, Damodar N (2006), *Essentials of Econometrics*, McGraw-Hill. Inc
10. David R.Anderson, Dennis J.Sweeney (2011), Thomas A.Williams, *Statistics for business and economics*, 11th edition, South-Western, Cengage Learning.
11. Mark L. Berenson, David M. Levine, Timothy C. Krehbiel (2009), *Basic Business Statistics, Concepts and Applications*, Eleventh edition, Pearson International Edition.

7. REQUIRED TEXTBOOK & COURSE MATERIALS

Tran Thi Kim Thu (2012), *Statistical Theory*, National Economics Publishing House

8. RECOMMENDED TEXTS & OTHER READINGS

1. Tran Ngoc Phac and Tran Thi Kim Thu (2006), *Statistical Theory – Chapter 5*, Statistical Publishing House
2. Institute of Statistical Science (2010), *Statistics practice (translated version)* – Statistical Publishing House
3. Nguyen Cao Van and Tran Thai Ninh (2008), *Probability and Mathematical Statistics Theory*, National Economics Publishing House
4. Tang Van Khien (1995), *The basic issues of sample survey*, Statistical Publishing House
5. David R.Anderson, Dennis J.Sweeney (2011), Thomas A.Williams, *Statistics for business and economics*, 11th edition, South-Western, Cengage Learning.

6. Mark L. Berenson, David M. Levine, Timothy C. Krehbiel (2009), *Basic Business Statistics, Concepts and Applications*, Eleventh edition, Pearson International Edition.
7. Ken Black (2008), *Business Statistics for Contemporary Decision Making*, Fifth edition, Wiley.

9. ASSESSMENT & GRADING POLICY:

Comply with the current regulations of National Economics University.

- The evaluation of teachers: 10%

- Mid-course test: 30%

- Final test: 60%

(Students are eligible to sit the final test if: the evaluation of teachers is at least 5, the minimum of midterm test score is 3)

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

MSc. Do Van Huan

Prof.Dr. Tran Tho Dat