

## **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: Mathematics for Economics 2**

Code: TOCB 1106

Number of Credits: 03

#### **2. DEPARTMENT IN CHARGE OF INSTRUCTION**

**Department of fundamental mathematics**

**Office:** 4<sup>th</sup> floor, Building 7, National Economics University, 207 Giai Phong road, Hanoi, Vietnam

**Office Hours:** 8am-5pm, from Monday to Friday

**Office Telephone:** 084 4 36283007, ext: 5944 or 5798

#### **3. PRE-REQUISITE: Mathematics for Economics 1 (TOCB1105)**

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

The module is located in the general knowledge of curriculum BA in economics and business administration. The module provides the basic content of calculus in economic applications. The module aims to train thinking ability, improve math skills and application of knowledge in math analysis, object research and economics. This unit is also equipped with the basic knowledge to students learning modules Microeconomics, Macroeconomics, Mathematical models in economics, Probability theory and statistics, Econometrics. The course will introduce mathematical concepts and their applications on economics and business. We emphasize on Calculus, which are widely used in almost all branches of sciences, including business and economics. Students will get familiar with some basic concepts about Calculus of one variable functions, calculus of multivariate functions, exponential, logarithmic function, integration, Optimization problem of function of several variables and learn how to use them to solve economic problems. The course is application-oriented; students will learn the use of mathematics through its applications.

#### **5. LEARNING OUTCOMES**

On successful completion of this course students will be able to:

- \* To gain confidence with mathematics
- \* To develop analytical skills
- \* To develop organizational skills
- \* To develop both independent learning and group work skills
- \* To develop verbal and non-verbal communication skills
- \* To successfully use mathematics in economics and business applications

## 6. COURSE OBJECTIVES

### TOPICS TO BE COVERED

- Function of several variables
- Differentiation of the function of one variable.
- Differentiation of the function of several variables.
- Economic applications
- Exponents and Logarithmic function
- Integration and its economic applications

## 7. COURSE CONTENT AND LECTURE PLAN

### TENTATIVE SCHEDULE

<i>No</i>	<i>Contents</i>	<i>Total hours</i>	<i>In details</i>	
			<i>Theory</i>	<i>Practice, Discussion, Exams</i>
1	Chapter 1. Function and limits	3	2	1
2	Chapter 2. Derivatives and differentiation	9	6	3
3	Chapter 3. Functions of several variables	9	6	3
4	Chapter 4. Unconstrained optimization and constrained optimization	9	6	3
5	Chapter 5. Integration	9	6	3
6	Chapter 5. Differential Equations	6	4	2
	<b>Total</b>	<b>45</b>	<b>30</b>	<b>15</b>

### Week 1: CHAPTER I. FUNCTIONS AND LIMITS

*Chapter 1 provides fundamental concepts of functions, some concepts and theorems of limits of sequence, limits of function, continuity.*

#### 1.1. Fundamental concepts of functions of one variable

- 1.2. Sequence and limit of sequence
- 1.3. Limit of a function
- 1.4. Continuous Functions

**Reading and Homework: Chapter 6[1], Chapters 2[3], Chapter 2, 3, 4 [6]**

## **Weeks 2-4: CHAPTER 2: DERIVATIVES AND DIFFERENTIATION**

*This chapter covers the differential calculus of functions of one variable: differentiability, L'Hospital's rule, and Taylor's theorem. Chapter 2 reviews applications of derivative in economics and mathematics. It introduces some optimal problem in analysis economic.*

- 2.1. Derivatives
- 2.2. The differentiation of function
- 2.3. The basic theorem about differentiable functions
- 2.4. Higher-order derivative and differentiation – Taylor's formula
- 2.5. Applications of the derivatives to mathematics
- 2.6. Applications of the derivative to economics

**Reading and Homework: Chapter 7[1], Chapters 3, 4, 5 [3], Chapter 5, 6 [6], Chapter 1, 2, 3[2]**

## **Weeks 5-7: CHAPTER 3: FUNCTIONS OF SEVERAL VARIABLES**

*This chapter treats differentiation of functions of several variables and applications of these. Chapter 3 introduces basic concepts, limits, continuity, partial derivatives and application of these in economics.*

- 3.1. Basic concepts of several variables
- 3.2. Limits and continuity of function
- 3.3. Partial Derivatives
- 3.4. Homogeneous function
- 3.5. Implicit function

**Reading and Homework: Chapter 8[1], Chapters 6 [2], Chapter 11, 12 [6], Chapter 1, 2, 3[2], Chapter 13, 14 [7]**

## **Weeks 8-10: CHAPTER 4: UNCONSTRAINED OPTIMIZATION AND CONSTRAINED OPTIMIZATION**

*Chapter 4 reviews optimal problems of functions of several variables, introduces how to solve these problems and economic applications.*

- 4.1. Unconstrained optimization
- 4.2. Constrained maxima and minima

4.3. Problems about choice of consumer

4.4. Problems about choice of producer

Midterm Test

**Reading and Homework: Chapter 9[1], Chapters 6 [2], Chapter 12, 13, 14 [6], Chapter 16 [8], Chapter 17, 18 [7]**

**Weeks 11-13: CHAPTER 5: INTEGRATION**

*Chapter 5 discuss integral of functions. The contents includes concepts, properties and ways to evaluate antiderivatives, definite integral, improper integral and economic applications.*

5.1. Antiderivatives and indefinite integrals

5.2. Definite integrals

5.3. Applications of integration to economics

**Reading and Homework: Chapter 10 [1], Chapters 4, 5 [2], Chapter 16 [6], Chapter 5, 6, 8 [3].**

**Weeks 14-15: CHAPTER 6: DIFFERENTIAL EQUATIONS**

*Chapter 6 introduces some general concepts of differential equations and some method to solve first order, second order ordinary differential equations.*

6.1 The basic concepts of differential equations

6.2 Solving methods some first order ordinary differential equations

6.3 Second order linear equations

**Reading and Homework: Chapter 11 [1], Chapter 18, 21, 22, 23 [6], Chapter 9, 19 [3].**

**Final Examination**

**8. REQUIRED TEXTBOOK & COURSE MATERIALS**

[1] Required: Advanced Mathematics for Economist, Le Đình Thuy, Nguyen Thi Quynh Lan, (2012).

**9. RECOMMENDED TEXTS & OTHER READINGS**

[2] Additional: Calculus and its applications, Tenth Edition, MARVIN L. BITTINGER AND DAVID J. ELLENBOGEN, SCOTT A. SURGENT, (2012).

[3] Additional: Methods of mathematical Economics, CHIANG, A.C, (1985).

[4] Additional: Applied Calculus for business, Economics, and Finance, WARREN B. GORDON, WALTER O. WANG, APRIL ALLEN MATEROWSKI, (2007).

[5] Additional: Basic Mathematics for Economists, MIKE ROSSER, Second edition, (2003).

[6] Additional: Mathematics for economics, Second edition, MICHAEL HOY, JOHN LIVERNOIS, CHRIS MCKENNA, RAY REES, THANASIS STENGOS, (2001).

[7] Additional: Mathematics for Economists, CARLP. SIMON, LAWRENCE BLUME, (1994).

[8] Additional: Calculus one and several variables, tenth edition, John Wiley & Sons, INC, SALAS HILLE ETGEN (2007).

## 10. ASSESSMENT & GRADING POLICY

Your course score will be determined as the following weighted average:

Item	Weight
Attendance	10%
Midterm	20%
Final Exam	70%
<b>Total</b>	<b>100%</b>

Grading Criteria: %		Letter Grade
96%-100%	A+	4,0
91%-95%	A	4,0
85%-90%	A-	3,7
81% - 84%	B+	3,3
7,6%-80%	B	3,0
71%-75%	B-	2,7
66%-70%	C+	2,3
61%-65%	C	2,0
55%-60%	C-	1,7
51%-54%	D+	1,3
46%-50%	D	1,0
40%-45%	D-	0,7
<39%	F/WU/IC	0,0

- **Attendance policy:**

Attendance is required. You are responsible for everything that happens in the class. If you miss a class, ask your friends about materials covered in the class. The parts of the course are very well related to each other. It is a requirement that a student need to attend at least 80% time of course to have the right to take the final exam.

*Hanoi, 2016*

**HEAD OF DEPARTMENT**

**PRESIDENT**

(signed)

(signed)

**PhD. Tong Thanh Trung**

**Prof.Dr. Tran Tho Dat**