

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: Calculus 1

Code: TOCB 1102

Number of Credits: 02

2. DEPARTMENT IN CHARGE OF INSTRUCTION

Department of fundamental mathematics

Office: 4th 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: None

4. COURSE DESCRIPTION

The module is located in the general knowledge of curriculum BA in mathematical foundation for students majoring in Mathematical Economics and Mathematical finance and it is also a useful tool for students to access, analyze, study models in economics by meaning of complex mathematics in the future. The module also 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 introduces mathematical concepts and their applications on economics and business. Students will get familiar with some basic concepts about Calculus of one variable functions, calculus of multivariate functions, integration, Optimization problems 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

This course is the first one in a series of two, covering miscellaneous topics of mathematical analysis for real valued functions of one and several variables.

TOPICS TO BE COVERED

- Function of several variables
- Differentiation of the function of one variable.
- Differentiation of the function of several variables.
- Economic applications
- 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	6	4	2
2	Chapter 2. Derivatives and differentiation	6	4	2
3	Chapter 3. Functions of several variables	6	4	2
4	Chapter 4. Unconstrained optimization and constrained optimization	6	4	2
5	Chapter 5. Integration	6	4	2
	Total	30	20	10

Weeks 1 – 3: CHAPTER 1. 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 function
- 1.4. Continuous Functions

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

Weeks 4 - 6: 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 7 - 9: 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 10 - 12: 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

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

Week 12: Midterm Exam

Weeks 13 - 15: CHAPTER 5. INTEGRATION

Chapter 5 discusses integral of functions. The content 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].

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%
Total	100%

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