
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: Numerical Analysis

Code: TOTC1104

Number of Credits: 02

2. DEPARTMENT IN CHARGE OF INSTRUCTION:

Department of Mathematical Finance

Office: Faculty of Economic Mathematics

Office Hours: Working hours, the working day

Office Telephone: (84) 04 3628 3007

3. PRE-REQUISITE:

Algebra, Analyse1-2, Computer Skills.

4. COURSE DESCRIPTION:

Numerical analysis is responsible for the numerical results of the problem, it provides the solution method for the problem in the context that there is no exact answer. This course is a bridge between theoretical mathematics and practical applications. In current computing conditions, applying the calculation method becomes popular to increase computing speed.

Numerical analysis is an optional subject for 2nd year, 3rd year and 4th year students specialized in applied Mathematics for Economics.

5. COURSE OBJECTIVES:

The course gives students some concepts and basic methods to solve approximate math problems.

The course provides learners with mathematical skills to calculate approximate solutions to practical problems and computer skills to perform the method of approximate solutions.

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	9	6	3	
3	Chapter 3	9	6	3	
4	Chapter 4	6	4	2	
	Total	30	20	10	

CHAPTER 1: ERROR OF CALCULATION

This chapter introduces the concept of an approximate calculation such as error, the decimal representation, the total infinite ... The contents are as follows:

1.1. Error

1.1.1. Definition

1.1.2. Relative error and absolute error

1.1.3. The causes of the error

1.2. Decimal representation

1.3. Wrong number of values given by algebraic expressions

1.4. Total infinite

1.5. Approximate value of the analytic function

References of the chapter:

- 1) Ta Van Dinh (1999), *Numerical Analysis*, Education Publishing House.
- 2) J. Stoer, R. Bulirsch (1991), *Introduction to Numerical Analysis*, 2nd Edition, Springer - Verlag.

CHAPTER 2: INTERPOLATION AND APPLICATION

This chapter introduces interpolation methods which calculate approximately the value of the polynomial, approximately definite integrals... This chapter also introduces the least-squares method, a tool commonly used in the approximate solutions to economic problems and techniques.

2.1. Interpolate

2.1.1. Interpolation of polynomial function

2.1.2. Polynomial interpolation for any function

2.1.3. Polynomial interpolation segment

2.2. Approximate definite integrals

2.2.1. Formula trapezoidal

2.2.2. Formula Simpson

2.3. Least squares method

References of chapter

- 1) Pham Ky Anh (1996), *Numerical Analysis*, Ha Noi National University Publishing House.
- 2) J. Stoer, R. Bulirsch (1991), *Introduction to Numerical Analysis*, 2nd Edition, Springer - Verlag.
- 3) John C. Brooks (2006), *Mastering Technical Analysis Using the Tools of Technical Analysis for Profitable Trading*, Mc. Graw-Hill.

CHAPTER 3: APPROXIMATE SOLUTION EQUATIONS

This chapter presents the basic methods to solve these specific problems: Find the approximate test of algebraic equations, transcendental equation and differential equations.

3.2. Approximation of the equations experience on segment

3.1.1. Split method

3.1.2. Iterative methods

3.1.3. Method chord

3.1.4. Tangent method

3.2. Approximate experimental equations

3.2.1. Euler's method

3.2.2. Improved Euler method

3.2.3. Method Runge - Kutta

References of chapter

- 1) Pham Ky Anh (1996), *Numerical Analysis*, Ha Noi National University Publishing House.
- 2) J. Stoer, R. Bulirsch (1991), *Introduction to Numerical Analysis*, 2nd Edition, Springer - Verlag.
- 3) John C. Brooks (2006), *Mastering Technical Analysis Using the Tools of Technical Analysis for Profitable Trading*, Mc. Graw-Hill.

CHAPTER 4: NUMERICAL METHODS IN LINEAR

This chapter introduces the numerical methods in linear algebra: League approximate equations linear algebra; find own values and own vectors matrix.

4.1. Approximation of the experimental system of linear algebraic equations

4.1.1. Single loop method

4.1.2. Seidel iteration method

4.2. Iterative methods to find its own value with the largest modules (minimum)

References of the chapter:

- 1) Ta Van Dinh (1999), *Numerical Analysis*, Education Publishing House.
- 2) J. Stoer, R. Bulirsch (1991), *Introduction to Numerical Analysis*, 2nd Edition, Springer - Verlag.
- 3) John C. Brooks (2006), *Mastering Technical Analysis Using the Tools of Technical Analysis for Profitable Trading*, Mc. Graw-Hill.

7. REQUIRED TEXTBOOKS & COURSE MATERIALS:

- 1) Pham Ky Anh (1996), *Numerical Analysis*, Ha Noi National University Publishing House.

8. RECOMMENDED TEXTS & OTHER READINGS:

- 1) Pham Ky Anh (1996), *Numerical Analysis*, Ha Noi National University Publishing House.
- 2) Ta Van Dinh (1999), *Numerical Analysis*, Education Publishing House.
- 3) J. Stoer, R. Bulirsch (1991), *Introduction to Numerical Analysis*, 2nd Edition, Springer – Verlag.
- 4) John C. Brooks (2006), *Mastering Technical Analysis Using the Tools of Technical Analysis for Profitable Trading*, Mc. Graw-Hill.

9. ASSESSMENT & GRADING POLICY:

- Scale (point) : 10
- Structure of points:
 - + Discussion: 10%
 - + The exercise, check out: 30%
 - + The final examination period: 60%

Hanoi, 2016

HEAD OF DEPARTMENT

PRESIDENT

(signed)

(signed)

PhD. Hoang Duc Manh

Prof.Dr. Tran Tho Dat