

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: Discrete Mathematics

Code: TOCB 1107

Number of Credits: 03

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: Algebra (TOCB1101), Calculus I (TOCB1102)

4. COURSE DESCRIPTION

* Discrete Mathematics is the base module of the training program of undergraduate Information Technology sector and Informatics. This course provides the knowledge as a basis for studying specialized subjects in computing and information technology.

* In this course, we want to give students a solid foundation of theoretical concepts and their applications.

- The basic concepts about logic and propositional logic

- The basic concepts of Algorithms, Complexity of Algorithms
- Counting principles, Permutations, Combinations
- Graph theory: Graph Terminology and Special Types of Graphs, Euler and Hamilton Paths, Shortest-Path Problems, Planar Graphs,...
- Trees: Rooted Tree, Spanning Trees
- Boolean Algebra

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 information technology and computing
- * Students can apply the knowledge of the course to solve optimization problems in practice, such as counting problems, the shortest path problems, Minimum Spanning Trees, graph coloring, ...

6. COURSE OBJECTIVES

TOPICS TO BE COVERED

- The Foundations: Sets, Logic and Proofs, Relations
- Algorithms
- Counting Principles
- Graph theory
- Trees
- Boolean Algebra

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. Foundation Knowledge	6	4	2
2	Chapter 2. Algorithm	6	4	2
3	Chapter 3. Combinatorial Theory	9	6	3
4	Chapter 4. Graph theory	9	6	3
5	Chapter 5. Trees	9	6	3
6	Chapter 6. Boolean Algebra	6	4	2
	Total	45	30	15

Weeks 1-2: **CHAPTER 1: FOUNDATION KNOWLEDGE**

- 1.1. Propositional Logic
- 1.2. Sets and Set operations
- 1.3. Relations and Functions

References of Chapter 1: Chapter 1 [1], Chapter 1 [2], Chapters 1, 3 [3], Chapter 1[4], Chapters 4, 5, 6 [5]

Weeks 3-4: **CHAPTER 2: ALGORITHM**

- 2.1. Algorithms
- 2.2. Complexity of Algorithms
- 2.3. Mathematical Induction
- 2.4. Recursive Definitions and Recursive Algorithms

References of Chapter 1: Chapter 2 [1], Chapter 2 [2], Chapters 9 [3], Chapter 1 [5]

Weeks 5-7: CHAPTER 3: COMBINATORIAL THEORY

- 3.1. Combinatorial theory
- 3.2. Counting problems
- 3.3. The existed problems
- 3.4. The listed problems
- 3.5. Optimization problems

References of Chapter 1: Chapter 3 [1], Chapters 4, 5 [2], Chapters 7 [3], Chapters 2, 3, 4, 5 [4], Chapter 2 [5]

Weeks 8-10: CHAPTER 4: GRAPH THEORY

- 4.1. Graphs and Graph
 - 4.2. Graph Terminology and Special Types of Graphs
 - 4.3. Representing Graphs and Graph Isomorphism
 - 4.4. Connectivity
 - 4.5. Euler and Hamilton Paths and Shortest-Path Problems
 - 4.6. Planar Graphs and Graph Coloring
- Midterm Examination

References of Chapter 1: Chapter 4 [1], Chapter 7 [2], Chapters 7 [3], Chapters 1, 2, 3, 4 [4].

Weeks 11-13: CHAPTER 5: TREES

- 5.1. Introduction to Trees
- 5.2. Applications of Trees and The tree browse methods
- 5.3. Tree Traversal
- 5.4. Spanning Trees and Minimum Spanning Trees

References of Chapter 1: Chapter 5 [1], Chapter 8 [2], Chapter 11 [3], Chapters 5, 6 [4], Chapter 8 [5].

Weeks 14-15: CHAPTER 6: BOOLEAN ALGEBRA

- 6.1. Introduction to Boolean Algebra
- 6.2. Representing Boolean Functions

6.3. The normal form of algebraic logic function

6.4. The algorithm for finding the minimum normal form

References of Chapter 1: Chapter 6 [1], Chapter 9 [2], Chapter 12 [3], Chapters 1, 2, 3 [4].

Final Examination

8. REQUIRED TEXTBOOK & COURSE MATERIALS

[1] Required: Discrete Mathematics Lecture, Tong Thanh Trung, Nguyen Thị An (2016), National Economics University Publisher.

9. RECOMMENDED TEXTS & OTHER READINGS

[2] Additional: Discrete Mathematics and Its Applications, Seventh Edition, Kenneth H. Rosen, (2012), Published by McGraw-Hill

[3] Additional: Discrete mathematical structures: Theory and applications, D.S. Malik and M.K. Sen (2004), Thomson Course technology.

[4] Additional: Discrete Mathematics, Nguyễn Đức Nghĩa, Nguyễn Tô Thành (2009), Hanoi National University Publisher

[5] Additional: Discrete mathematics applied for computers, third edition, Đỗ Đức Giáo (2014), Vietnam Education Publisher.

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

(signed)

PhD. Tong Thanh Trung

PRESIDENT

(signed)

Prof.Dr. Tran Tho Dat