Discrete Mathematics

Course Code:

MATH154

Course Period:

Spring

Course Type:

Core

Credits:

3

Theoric:

2

Practice:

2

Laboratory Hour:

0

ECTS:

7

Course Language:

English

Course Objectives:

The aim of this course is to introduce the topics and techniques of discrete methods and combinatorial reasoning with wide variety of applications.

Course Content:

Fundamental principle of counting. Introduction to discrete probability. Pigeonhole principle. Fundamentals of logic. The principle of inclusion and exclusion. Recurrence relations. Introduction to graph theory.

Course Methodology:

1: Lecture, 2: Question-Answer, 3: Lab, 4: Case-study

Course Evaluation Methods:

A: Testing, B: Experiment, C: Homework, D: Project

Learning Outcomes	Teaching Methods	Assessment Methods
1) Understands and solves problems in counting using the basic principles of counting.	1,2	A
2) Uses the principle of inclusion and exclusion to solve related problems indirectly.	1,2	A
3) Expresses a given argument in symbolic logic and decides whether it is a valid argument or not using the laws of logic and inference rules.	1,2	A
4) Solves first-order linear recurrence relations, second-order linear homogeneous recurrence relations with constant coefficients and some particular nonhomogeneous recurrence relations.	1,2	A
5) Models a given particular situation or a problem using graph theory.	1,2	A
6) Decides whether or not given graphs are isomorphic.	1,2	A

Week	Topics	Study Materials
1	The rules of sum and product. Permutations	1.1, 1.2
2	Combinations: The binomial theorem	1.3
3	Combinations with repetition	1.4
4	An introduction to discrete probability. The pigeonhole principle	((II) 6.1), 5.5
5	Basic connectives and truth tables	2.1
6	Logical equivalence: The laws of logic	2.2
7	Logical implication: The rules of inference	2.3
8	The use of quantifiers	2.4
9	The principle of inclusion and exclusion	8.1
10	The first-order linear recurrence relation	10.1

11	The Second-order linear homogeneous recurrence relation with constant coefficients	10.2
12	The nonhomogeneous recurrence relation	10.3
13	An introduction to graph theory: Definitions and basic examples	11.1
14	Subgraphs, complements and graph isomorphism	11.2

Textbook

1. Discrete and Combinatorial Mathematics, R.P. Grimaldi, Addison-Wesley, 5th edition, 2004.

Additional Resources

1. Discrete Mathematics and Its Applications, K. H. Rosen, Mc Graw Hill, 6th edition, 2007.

Documents	
Assignments	
Exams	

IN-TERM STUDIES	**NUMBER**	**PERCENTAGE**
Mid-terms	1	100
Quizzes		
Assignments		
Total		**100**
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		60
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		40
Total		**100**

COURSE CATEGORY	Core Courses

No	Program Learning Outcomes	Contribution				
		1	2	3	4	5

1	The ability to make computation on the basic topics of mathematics such as limit, derivative, integral, logic, linear algebra and discrete mathematics which provide a basis for the fundamenral research fields in mathematics (i.e., analysis, algebra, differential equations and geometry)					x
2	Acquiring fundamental knowledge on fundamental research fields in mathematics	x				
3	Ability form and interpret the relations between research topics in mathematics	x				
4	Ability to define, formulate and solve mathematical problems				x	
5	Consciousness of professional ethics and responsibilty				x	
6	Ability to communicate actively	x				
7	Ability of self-development in fields of interest					x
8	Ability to learn, choose and use necessary information technologies	x				
9	Lifelong education				x	

Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (14x Total course hours)	14	4	56
Hours for off-the-classroom study (Pre-study, practice)	14	6	84
Mid-terms (Including self study)	1	15	15
Quizzes			
Assignments			
Final examination (Including self study)	1	20	20
Total Work Load			175
Total Work Load / 25 (h)			7
ECTS Credit of the Course			7