

Department of Mathematics

Course Profiles

Course Number: MATH 142	Course Title: Discrete Mathematics
Required / Elective: Required	Prerequisite: None
Catalog Description: Logic and sets, functions. Mathematical reasoning, counting, relations, graphs, trees, algebraic structures, Boolean algebra. Modelling computation.	Textbook / Required Material: Kenneth H. Rosen, <i>Discrete Mathematics and Its Applications</i> , Fifth Edition, McGraw-Hill, 2003.
Course Structure / Schedule: (3+1+0) 3 / 4 ECTS	
Extended Description : The foundation of discrete mathematics: i) logic (Propositions, Propositional Equivalences, Predicates and Quantifiers); ii) Methods of Proof (Direct and Indirect Proofs, Proofs by Contradiction, Proof Strategy); iii) Sets, Functions, Integers and Division. Mathematical Reasoning, Mathematical Induction and Recursion: i) Mathematical Induction, Strong Induction ii) Recursion (Recursive Definitions, Structural induction, Recurrence Relations). Counting: i) The Basic of Counting (Permutations and Combinations); ii) Pigeonhole Principle iii) Inclusion-Exclusion. Relations: Relations and Their Properties, Representing Relations and Equivalence Relations. Graphs and Trees: i) (Graph Terminology, Representing Graphs, Graph Isomorphism, Connectivity); ii) Introduction to Trees.	
Design content: None	Computer usage: No particular computer usage required
<p>Course Outcomes: By the end of the course, the students should be able to</p> <ol style="list-style-type: none"> 1. Read and understand logical propositions, mathematical theorems [1, 2, 3, 6], 2. Follow mathematical proofs, recognize and use the different type of proof techniques [1, 2, 3, 6], 3. Construct mathematical arguments [1, 2, 3, 6], 4. Count or enumerate objects [5, 6], 5. Work with discrete structures and be able to represent discrete objects and recognize the relationships between discrete objects [5, 6, 7], 6. Use problem-solving skills [5, 6, 7], 7. Recognize the applications of discrete mathematics to computer science, information technologies [4, 7]. <p>[1] Demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,</p> <p>[2] Demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,</p> <p>[3] Demonstrate the ability to apply mathematics to the solutions of problems,</p>	

<p>[4] Have a basic knowledge of economics, information sciences and social sciences,</p> <p>[5] Have an ability to write computer programs and use algorithms for solving problems,</p> <p>[6] Have a basic knowledge of the main fields of mathematics, including analysis, algebra, differential equations, differential geometry,</p> <p>[7] Have an ability to function both independently and as a member of a multidisciplinary team.</p>													
<p>Recommended reading: George Polya, <i>How to Solve It</i>, Princeton University Pres, 2004. R.P. Grimaldi, <i>Discrete and Combinatorial Mathematics</i>, Addison-Wesley, 1998.</p>													
<p>Teaching methods: Pre-readings, lecture, quizzes, tutorials, individual exercises and discussions.</p>													
<p>Assessment methods: Quizzes, homework, final exam</p>													
<p>Student workload:</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding-left: 40px;">Preparatory reading</td> <td style="text-align: right;">30 hrs</td> </tr> <tr> <td style="padding-left: 40px;">Lectures, tutorials, discussions, presentations...</td> <td style="text-align: right;">45 hrs</td> </tr> <tr> <td style="padding-left: 40px;">Homework</td> <td style="text-align: right;">20 hrs</td> </tr> <tr> <td style="padding-left: 40px;">Quizzes</td> <td style="text-align: right;">2 hrs</td> </tr> <tr> <td style="padding-left: 40px;">Final Exam</td> <td style="text-align: right;">3 hrs</td> </tr> <tr> <td style="padding-left: 40px;">TOTAL</td> <td style="text-align: right;">100 hrs... to match 25 x 4 ECTS</td> </tr> </table>		Preparatory reading	30 hrs	Lectures, tutorials, discussions, presentations...	45 hrs	Homework	20 hrs	Quizzes	2 hrs	Final Exam	3 hrs	TOTAL	100 hrs... to match 25 x 4 ECTS
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Prepared by: Türker Bıyıkoğlu	Revision Date: 08.02.2010												