



**University of Tehran**  
**School of Electrical and Computer Engineering**

<b>Course:</b>	<b>8101480 – Discrete Mathematics</b>									
<b>Course type:</b>	EE*						CE*			Credit: 3
	Com	E	P	B	Con	D	SW	HW	IT	
	Required	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
	Elective	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Level:</b>	Undergraduate <input checked="" type="checkbox"/> Graduate <input type="checkbox"/>									
<b>Co-requisite(s):</b>	None.									
<b>Prerequisite(s):</b>	Introduction to Computer and programming (8101347), Calculus I (8101206)									
<b>Prerequisite by topic:</b>	Mathematics, Fundamentals of Computer Programming (C prog)									
<b>Textbook(s):</b>	[1] Kenneth. H. Rosen, <i>Discrete Mathematics and Its Applications</i> , McGraw-Hill, 6th Ed. , 2006.									
<b>Coordinator:</b>	Siamak Mohammadi, Assistant Professor, School of ECE									
<b>Goals:</b>	This course covers several mathematical concepts including, but not limited to, Sets, Relations, Induction, Recursion, Logic, Counting and Graphs, which constitute the foundation for further studies in both theoretical and applied Computer Science and Engineering.									
<b>Outcome:</b>	Upon successful completion of the course, students will be able <ol style="list-style-type: none"> <li>1. To understand mathematical reasoning and exercise methods of proofs and improve their problem-solving skills</li> <li>2. To do combinatorial analysis and count enumerable objects</li> <li>3. To work with discrete structures such as sets, permutations, relations, graphs and trees</li> <li>4. To understand algorithmic thinking</li> </ol>									
<b>Topics:</b>	<ol style="list-style-type: none"> <li>1) <b>Fundamental of Logic and Proofs</b> (propositional logic and equivalences, predicates and quantifiers, proof strategy)</li> <li>2) <b>Sets, Functions, Sequences and Sums</b></li> <li>3) <b>The Fundamentals: Invariance Principles, Number Theory</b> (integer and division, GCD)</li> <li>4) <b>Induction and Recursion</b> (mathematical and strong inductions)</li> <li>5) <b>Counting</b> (permutations and combinations, binomial coefficient, generalized pigeonhole principle)</li> <li>6) <b>Advanced Counting Techniques</b> (recurrence relations, generating functions, inclusion-exclusion)</li> <li>7) <b>Relations</b> (properties, closure of relations, equivalence relations, partial ordering, Hasse diagram, lattice)</li> <li>8) <b>Graph</b> (terminology, representations, isomorphism and homomorphism, connectivity, Euler and Hamiltonian paths, Dijkstra, planar graphs, graph coloring)</li> </ol>									

	9) <b>Trees</b> (properties, spanning trees, BFS, DFS, Kruskal and Prim algorithms)
<b>Computer usage:</b>	
<b>Assignments:</b>	12 homework assignments, Quizzes, ACM computer assignment (bonus)
<b>Projects:</b>	
<b>Grading:</b>	Assignments: 17.5% Quiz: 17.5% Midterm exam: 30% Final exam: 35%
<b>Further readings:</b>	[1] Ralph. P. Grimaldi, <i>Discrete and Combinatorial Mathematics: An Applied Introduction</i> , Addison-Wesley, 5th Ed. , 2003.
<b>Prepared by:</b>	Siamak Mohammadi
<b>Date:</b>	September 23, 2017

*EE: Electrical Engineering		CE: Computer Engineering	
Com	Communications	SW	Software
E	Electronics	HW	Hardware
P	Power	IT	Information Technology
B	Bioelectronics		
Con	Control		
D	Digital System		