CmpE 220 Discrete Computational Structures

Instructor	H. Birkan YILMAZ (birkan.yilmaz@boun.edu.tr)
Teaching Assistants	Suzan Ece Ada **PS Hours:** TBA
Class Hours	WW 78 **NewHall 401** + Th 8 **NewHall 401**
Midterm	14 November (Tuesday)
Teaching Style	In-Class
Course Website	moodle.boun.edu.tr
Textbook	Discrete Mathematics and Its Applications, 6e; **Rosen**; McGraw-Hill, 2007
Reference Books	Discrete and Combinatorial Mathematics, 5e; Grimaldi; Addison-Wesley, 2004
	Introduction to Discrete Structures; Preparata and Yeh; Addison-Wesley, 1973
	Applied Abstract Algebra; Lidl and Pils; Springer-Verlag, 1984
	Nicholas A. Loehr, An introduction to mathematical proofs
Goals	This course is designed to teach i) propositional logic and proofs, ii) Set theory, iii) functions and relations, iv) algebraic structures, v) groups and semi-groups vi) Graphs vii) lattices and Boolean algebra.
Good-to-know	Latex

Tentative Outline

Week 1 : Logic & Proof Techniques
- Introduction to Propositional Logic
- Logical Equivalence and Tautologies
- Rules of Inference

Week 2 : Logic & Proof Techniques
- Proof Techniques
- Introduction to Mathematical Induction
- Pigeon Hole Principle

Week 3 : Sets
- Introduction to Sets
- Product Sets

Week 4 : Relations

Week 5 : Order & Equivalence Relations

Week 6 : Functions
- Compositions
- Bijections and Inverse Functions
- Images and Inverse Images

Week 7 : Cardinality – Finite Sets & Basics of Counting
- Combination and Permutation
- Discrete Probability
- Principle of Inclusion and Exclusion

Week 8 : Cardinality – Infinite Sets
- Countable Infinite Sets
- Uncountable Infinite Sets

Week 9 : Algebra I – Definitions
- Operations on Sets
- Homomorphism

Week 10: Algebra II – Basic Algebraic Structures
- Groups (Monoids, Abelian Groups)
- Rings (Euclidean Division Theorem, Fermat's Theorem)

Week 11: Recursion
- Mathematical Induction Revisited
- Recursive Definitions
- Recursive Algorithms
- Inclusion-Exclusion Revisited
- Generating Functions

Week 12: Graphs I –Terminology & Theorems (**Rosen**)

Week 13: Graphs II – Shortest Path & Graph Coloring Problems (if time permits)

Basis for evaluation (A change of +- 5% may occur in the basis of evaluation!)	
1 Midterm exam (In-Class)	27 %
2-3 Pop Quizzes (In-Class)	18 %
1-2 Assignments (Homework)	20 %
Final exam (In-Class)	35 %
Total	100 %

Important: **Homeworks** assigned in this course are essential for passing the course. If you fail to submit on time, you will also fail the course!

Academic Honesty:
Needless to say, honesty and trust are crucial to all of us. Cheating, plagiarism and collusion are serious offences and they will result in an overall F grade and **disciplinary action**.