Discrete Mathematics and Algorithms (CSE611)

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Welcome
to
Discrete Mathematics and Algorithms

Course Overview

- Sets, relations, functions, permutations, combinations.
- Mathematical induction, pigeonhole principle.
- Cardinality of sets, finite and infinite sets, countable and uncountable sets, Cantors numbering.
- Groupoid, semigroup, monoid, group, subgroup, normal subgroup, homorphism, automorphism, isomorphism, eipmorphism, cosets, quotient group, product set in a group, center of a group, order of an element in a group, conjugate of an element in a group, commutator.
- Ring, Field, Finite field over a prime.
- Recurrence relations, generating functions, numeric functions.
- Coding theory.
- Basics of probability theory, birthday attacks, hash functions.

Course Overview (Continued...)

- Asymptotic complexity.
- Algorithmic paradigms: Dynamic Programming, Divide-and-Conquer, Backtracking, Greedy.
- Probabilistic algorithms.
- Graphs: Graphs and their basic properties - degree, path, cycle, subgraphs, isomorphism, Eulerian and Hamiltonian walks, graph coloring, planar graphs, Shortest paths, Flow networks.
- Trees: Basic properties, counting problem on trees, tree traversals, AVL, Merge Tree, Huffman codes.
- P, NP, NP-Hard and NP-completeness: discussion of different NP-complete problems like satisfiability, clique, vertex cover, independent set, Hamiltonian cycle, TSP, etc.
- Computational Geometry.

Text Books/References

- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Clifford Stein, “Introduction to Algorithms”, PHI.
- Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Fundamentals of Computer Algorithms”, Galgotia.
- Ellis Horowitz, Sartaj Sahni and Sanguthevar Rajasekaran, “Computer Algorithms/C++”, Second Edition, Universities Press.
- Thomas Koshy, “Discrete Mathematics with Applications”, Elsevier Press.
- C. L. Liu, “Elements of Discrete Mathematics”, Tata McGraw-Hill Edition.

Text Books/References (Continued...)

- C. L. Liu and D. P.Mohapatra, “Elements of Discrete Mathematics: A Computer Oriented Approach,” Tata McGraw-Hill Edition.
- J.P. Tremblay and R. Manohar, “Discrete Mathematical Structures with applications to Computer Science”, Tata. McGraw-Hill Publishing Company Pvt. Ltd.
- Rajendra Kumar Sharma, Sudesh Kumari Shah, and Asha Gauri Shankar, “Algebra I,” Pearson, 2012.

Lecture and Tutorial Hours

- Tuesday: 2:00 PM - 4:00 PM (Lecture)
- Friday: 2:00 AM - 4:00 PM (Lecture)
- Tutorial slot to be fixed soon (Tutorial)
- Venue: 204 (Himalaya Building)

Grading Plan

- Grading method: Relative

Letter Grade	Value	Description
A	10	Excellent
A-	9	Excellent
B	8	Good
B-	7	Good
C	6	Fair
C-	5	Fair
D	4	Poor
F	0	Fail

Grading Plan (Continued...)

- Mid-Semester Examination 1: 20%
  (Syllabus: Upto Mid-Sem1 lectures)
- Mid-Semester Examination 2: 20%
  (Syllabus: After Mid-Sem1 and upto Mid-Sem2 lectures)
- End-Semester Examination: 40%
  (Syllabus: After Mid-Sem2 and upto End-Sem lectures)
- Home Assignments : 5%
- In-class problem solving skills (6 surprised class tests) : 10%
- Class Lecture Preparation : 5%

Rules for attending this course

- Attendance is mandatory and Grades will be reduced as per Institute rules
  (**NOTE: Know rules from Academic Section, Appaji**).
- Creating disturbances in the class is NOT allowed.
- Assignment copying is prohibited and if found, your marks in assignment evaluation will be treated as ZERO.
- Sleeping in class is NOT tolerable under any circumstances.