



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2021-2022
Course Handout Part II

Date: 20-08-2021

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CS F222
Course Title : Discrete Structures for Computer Science
Instructor-in-Charge : Raghunath Reddy M
Instructors : Manjanna B and K Simran

Scope and Objective of the Course: This course aims to provide the mathematical foundations for many computer science courses including data structures, algorithms, databases theory, automata theory, formal languages, compiler theory, computer security, and operating systems. This course can develop mathematical maturity to understand and create mathematical arguments. The course encompasses topics like methods of proof (induction, contradiction, proof by cases etc), set theory, functions, relations, partially ordered sets, lattices, graph theory, basic number theory and its application to cryptography, algebraic structures & coding theory. The objectives of the course are to:

- Equip students with mathematical foundations to study computer science subjects
- Understand different methodologies to prove or disprove a given proposition
- Understand mathematical structures and solve practical problems using these structures
- Understand advanced counting techniques

Textbooks:

T1. Kenneth H. Rosen: Discrete Mathematics and its applications, 8th edition, Tata McGrawHill Education Private Limited.

Reference books

R1. Eric Lehman, F Thomson Leighton, Albert R Meyer, Mathematics for Computer Science, 2018

R2. Martin Aigner, Gunter M. Ziegler, Proofs from THE BOOK

R3. Mott, Kandel, Baker, Discrete Mathematics for Computer Scientists and Mathematicians

R4. Douglas West: Introduction to Graph Theory, PHI, 2nd edition, 2011

R5. Miklos Bona: A Walk Through Combinatorics, World Scientific, 3rd edition



R6. David Burton: Elementary Number Theory, TMH, 7th edition

R7. Tremblay and Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata Mc-Graw-Hill Edition 1997.

R8. C. L. Liu, Elements of Discrete Mathematics, Second Edition.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1	To introduce the course	Introduction to Discrete Structures and its applications to Computer Science, Course overview	Class Notes
2-3	To understand different methodologies to prove or disprove a given proposition	Methods of Proof – Week and Strong Induction, Proof by Contradiction, Proof by cases etc.	T1 – Ch.1 & Ch.5
4-5	To learn sets, functions and their equivalent representations	Set Theory, Function	T1 – Ch.2
6-8	To learn relations, partial ordered sets and lattice theory with applications to computer science	Relations, Equivalence Relation, and Partially Ordered Sets,	T1 Ch.9
9-11	To understand techniques of counting	Basics of Counting, Pigeonhole Principle, Inclusion-Exclusion.	T1 – Ch.6
12-16	To understand recurrence and recurrence relations and how to solve them	Recurrence Relation and Generating functions, Solving recurrence relations using generating functions	T1 – Ch.5 & Ch.8, R3
17-21	To understand fundamentals concepts in graph theory	Graph Theory - Basic concepts, Isomorphism, Subgraphs, Special Graphs, Planar Graphs, Multi Graphs, Eulerian & Hamiltonian cycles/paths,	T1 – Ch.10, R3 and R4
22-26	To understand fundamental concepts of trees, spanning trees and algorithms to generate Minimum Spanning Trees	Trees, Spanning Trees, Minimum Spanning Trees, Chromatic numbers and Graph Coloring	T1 – Ch.11, R3 and R4
27-32	To learn basic number theory concepts required for cryptography	Basics in Number Theory – Primes, Factorization, GCD, Residues and application to cryptography	T1- Ch. 4
33-40	To learn Groups, Rings,	Algebraic Structures – Monoids,	R7- Ch. 3-4



	Fields and Coding Theory	Groups, Rings and Coding Theory	R8 -Ch.11-12
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Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Quiz-1	30 mins	10%	To be announced (before mid-sem)	Open Book
Quiz-2	30 mins	10%	To be announced (post mid-sem)	Open Book
Assignments (2 Nos.)	Take Home	15%	To be announced (one before mid-sem and one after mid-sem)	Open Book
Mid-Sem	90 mins	28%	18/10/2021 9.00 - 10.30AM	Open Book
Comprehensive Examination	120 mins	37%	11/12 FN	Open Book

Mid-Semester grading: Minimum 40% weightage will be considered for the mid-sem grading.

Chamber Consultation Hour: to be announced in the class.

Notices: All notices about the course will be put on CMS.

Make-up Policy: Make-up (other than Compre) will be granted only to genuine cases with prior permission only. For Comprehensive exam, make-up has to be approved and scheduled by AUGSD.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE

Raghunath Reddy M

