



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

SUMMER TERM 2026
COURSE HANDOUT (PART-II)

Date: May 21, 2026\6pt] In addition to Part I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.\8pt]

Course No. : CS F364
Course Title : Design and Analysis of Algorithms
Instructor-in-Charge : Dr. Tulasimohan Molli

1. Scope and Objective of the Course

This course is an advanced study that follows Data Structures and Algorithms. It is designed to equip students with a deep understanding of major algorithmic design paradigms and the techniques required for their rigorous analysis. The curriculum covers the formal analysis of algorithm correctness, time complexity, and space complexity. Students will also explore the theory of computational complexity, focusing on problem intractability, the class of NP-complete problems, and methods for dealing with computationally hard challenges. The primary objectives are to impart the characteristics of different algorithmic paradigms, enabling students to:

- Identify and apply suitable algorithmic paradigms and data structures to solve a given problem.
- Rigorously argue and establish the time complexity of algorithms.
- Develop formal proofs for the correctness of algorithms.
- Understand the fundamental role of data structures in efficient algorithm implementation.
- Grasp the concept of NP-completeness, lower bounds, and computational tractability.

2. Textbooks

1. **(T1)** Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, Clifford Stein. *Introduction to Algorithms*. Third Ed. MIT Press (2010).

3. Reference Books

1. **(R1)** Jon Kleinberg, Eva Tardos. *Algorithm Design*. First Ed. Pearson (2012).
2. **(R2)** E. Horowitz, S. Sahni, S. Rajsekar. *Fundamentals of Computer Algorithms*. Second Ed. Universities Press.
3. **(R3)** R. Motwani, P. Raghavan. *Randomized Algorithms*. Cambridge University Press, 1995.
4. **(R4)** G. Ausiello, et al. *Complexity and Approximation*. Springer.
5. **(AR)** Additional Reading assignments / research papers.

4. Course Plan

Lec.	Learning Objectives	Topics	Reference
1–5	Analyze efficiency via growth-of-function and asymptotic notations.	Intro to Growth of Function	T1: Ch 1–3
6–10	Design and analyze Divide & Conquer algorithms and recursion.	Divide and Conquer	T1: Ch 4, R1–2, AR
11–13	Formulate solutions for classical Dynamic Programming problems.	Dynamic Programming	T1: Ch 15, R1–2, AR
14–20	Apply greedy strategies and Matroid theory to prove optimality.	Greedy & Matroid Theory	T1: Ch 16, 23–24, R1–2
21–26	Model problems using Max-Flow Min-Cut and Randomization.	Network Flow & Randomization	T1: Ch 26, 5, R1–3
27–33	Analyze complexity classes (P, NP) and reduction techniques.	Complexity & NP-Completeness	T1: Ch 34, R4, AR
34–37	Differentiate Backtracking, Branch & Bound, and Approximation.	Hard Problem Techniques	T1: Ch 35, R2, R4
38–40	Formulate and solve Linear Programming models with Simplex.	Linear Programming	T1: Ch 29, AR
41–42	Design and analyze parallel and multi-threaded algorithms.	Parallel & Multithreading	T1: Ch 27, R1–2, AR

5. Evaluation Scheme

Component	Duration	Weightage	Date & Time	Nature of Component
In-class Evaluation	10–15 Mins each	10%	Surprise	Best 10 out of 12–15 quizzes
2 Assignments	Take-home+ viva	20%	One before mid and one after mid.	Coding assignments: 5% each
Midterm Exam	90 Mins	30%	20/06/2026	Closed Book
Comprehensive Exam	3 Hours	40%	15/07/2026	Closed Book

Note: At least 40% of the evaluation components will be completed before the Mid-Semester grading.

6. Course Policies

Chamber Consultation Hour

2 PM on Friday.

Notices

The Learning Management System (LMS) or student email will serve as the primary platforms for all course-related announcements. Please note that certain specific guidelines may be provided exclusively during lectures.

Make-up Policy

- **Assignments & Continuous Evaluation:** There is no provision for makeup components regarding assignments or in-class assessments. Submission timelines will be strictly observed.
- **Midterm Exam:** Makeup for tests can be given only for genuine cases and that too with prior approval from the instructor in charge.
- **Comprehensive Exam:** Makeup for the comprehensive exam will be decided as per instructions issued by AUGSD.

7. Academic Honesty and Integrity Policy

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

Instructor-in-Charge

Dr. Tulasimohan Molli