



Birla Institute of Technology & Science, Pilani

Pilani Campus

Centre for Software Development, SDET

Course Handout: Second Semester 2019-2020

Course Title: Introduction to Competitive Programming
Instructor-in-Charge: Mayank Jain [Email: f20170179@pilani.bits-pilani.ac.in]
Instructor: Rohit Rajhans [Email: f20170105@pilani.bits-pilani.ac.in]
Website: <http://discovery.bits-pilani.ac.in/CSDCourse/>
Hours: 6:00 - 7:30 pm, Monday and Thursday
Room: TBA

1. Objective and scope of the course:

This course is intended to develop competitive programming skills by providing in-depth knowledge of data structures. The course will adopt a problem-based approach to develop intuition and problem-solving skills. The course is recommended for beginners (First Year, Second Year and Non-Computer Science Students). It will help to build a foundation in preparing for interviews and coding contests.

2. Course Material :

A. Text Book:

- T1. Introduction to algorithms, 3rd edition, Thomas H. Cormen

B. Online Resources Link:

- R1: [Codechef](#)
- R2: [GeeksForGeeks](#)

3. Course Prerequisites-

- Basic knowledge of programming
- Acquaintance with C/C++

4. Course Plan:

Lecture #	Topic(s)	Reference*
1	Introduction to competitive programming, Learning Outcomes, Basic Concepts of C++ programming.	Class Notes
2	Time complexity and Sorting algorithms.	T1: Ch 3, Ch 7
3	Binary Search and its applications in monotonic-function/search-answer problems.	Class Notes
4	Math - Number theory, Combinatorics, Primes	T1: 31.2

5	Strings - manipulation, search and simulation	Class Notes
6	Standard template library - Basic OOP concepts (classes, generics), Working with C++ STL (vectors, iterators, maps, sets)	R1: Language constructs c++ 2
7	Bit Manipulation - Bitwise operators and Tricks with Bits	Class notes
8	Recursion - Divide and Conquer paradigm	T1: Ch 4
9	Advanced concepts on Linked Lists.	T1: Ch 10.2
10	Introduction to Stacks and Queues.	T1: Ch 10.1
11	Introduction to Heaps and Priority Queues.	T1: Ch 6
12	Backtracking and its applications in various domains.	Class notes
13-14	Trees- construction, simple operations, traversal, search, trie, sorting	T1: Ch 12
15-16	Introduction to Greedy Algorithms, why and where to use.	T1: Ch 16
17-19	Dynamic Programming- Introduction, Greedy vs DP, Knapsack problem, DP in Backtracking, Arrays and Strings	T1: Ch 15
20-22	Graphs - Introduction, Traversals (BFS and DFS), Kruskal's algorithm, Prim's algorithm, Dijkstra's algorithm, Minimum Spanning Tree, Shortest distance problems.	T1: Ch 22, T1: Ch 23, T1: Ch 24

Component	Duration	Type	Weightage	Date
Quiz -1	30 mins.	Open Book	10	-
Quiz -2	30 mins.	Open Book	10	-
Quiz -3	30 mins.	Open Book	10	-
Mid-sem	90 mins	Closed Book	30	-
End Semester (Online IDE)	180 mins.	Closed Book	40	-

5. **Make-up policy:** Only in genuine cases, on a case-by-case basis, Make-ups for quiz shall be allowed.

6. **Chamber Consultation Hours:** To be announced in class

Instructor-in-Charge:

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