GETTING STARTED WITH COMPETITIVE PROGRAMMING

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PREREQUISITES : Data Structures and Algorithms, Familiarity with a programming language (ideally C++ or Python)

INTENDED AUDIENCE : Undergraduate students who have already done a basic data structures/algorithms course.

INDUSTRIES APPLICABLE TO : Most technology-based companies typically hire based on a test of coding competence and this course will prepare students for this. Notable examples include: Facebook, Google, Amazon, Apple, Microsoft, etc.

COURSE OUTLINE :

This is a course on algorithm design with a focus on issues of modeling and implementation. Each lecture will be focused entirely on one or two problems that reveal the use of a specific algorithmic technique. The techniques themselves are chosen to be in line with those covered in existing NPTEL courses on data structures and algorithms, so that students who complete those courses can find in this course a natural follow up. This course is intended for anyone who wants to deepen their appreciation for algorithmic techniques that they have learned in a foundational course and/or would like to take a first step towards preparing for coding competitions such as the ICPC.

ABOUT INSTRUCTOR :

Prof. Neeldhara Misra is an Assistant Professor of Computer Science and Engineering at the Indian Institute of Technology, Gandhinagar. Her primary research interest involves the design and analysis of efficient algorithms for “hard” problems in general, and parameterized algorithms in particular. The problems considered are typically concerned with combinatorial optimization, frequently in the context of graph theory, social choice, games, geometry, and constraint satisfaction.

COURSE PLAN :

Week 1: Sorting and Searching Algorithms

Week 2: Greedy Algorithms - I

Week 3: Greedy Algorithms - II

Week 4: Disjoint Set Union with Path Compression

Week 5: Minimum Spanning Tree

Week 6: Shortest Paths: Dijkstra and Beyond

Week 7: Network Flows - I

Week 8: Network Flows - II, Divide and Conquer

Week 9: Dynamic programming - I

Week 10: Dynamic programming - II

Week 11: Dynamic programming - III

Week 12: Dynamic programming - IV