IN ORDER OF PREFERENCE: ALGORITHMIC PUZZLES
ALGORITHMS IMPLEMENTED DATA STRUCTURES AND
ALGORITHMS WITH C++ AND PYTHON
ALGORITHMS FOR COMPETITIVE PROGRAMMING

PROF. NEELDHARA MISRA
Department of CSE
IIT Gandhinagar

TYPE OF COURSE: New | Elective | UG
COURSE DURATION : 12 Weeks (26Jul 21 - 15 Oct 21)
EXAM DATE : 24th Oct 2021

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 :
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: Greedy Algorithms I - Interval Scheduling, Huffman Codes
Week 2: Greedy Algorithms II - Matroid Optimization, Matroid Intersection
Week 3: Disjoint Set Union with Path Compression
Week 4: Minimum Spanning Tree
Week 5: Shortest Paths: Dijkstra and Beyond
Week 6: Algorithms for Network Flows
Week 7: Applications of Network Flows
Week 8: Divide and Conquer
Week 9: Recursion
Week 10: Dynamic Programming warm up
Week 11: Dynamic Programming over two-dimensional tables
Week 12: Dynamic Programming over subsets