

DEVS

PRESENTS

Roadmap for becoming a
Successful CP



CP Roadmap for Beginners

Following is the roadmap to learning **CP** skills for a total beginner. It includes FREE learning resources for technical skills (or tool skills)

Total Duration: **3Months** (**3 hours** of study Every Day) Also,

Week 1: Introduction to Competitive Programming

Learn what competitive programming is, its importance, and how to get started. Understand the basic requirements and platforms for competitive programming.

Resources:

- Introduction to Competitive Programming: <https://www.youtube.com/watch?v=ueNT-w7Oluw>
- How to Start Competitive Programming: <https://youtu.be/bVKHRtafgPc?si=B1HcBioGi5RhBd67>

Week 2: Data Structures - Arrays and Strings

Learn about arrays and strings, their operations, and how to use them efficiently. Understand common problems involving arrays and strings.

Resources:

- Arrays and Strings Basics: https://www.youtube.com/watch?v=_wP9mWNPL5w
- Solving Array Problems: <https://www.youtube.com/watch?v=37E9ckMDdT&list=PLgUwDviBlf0rENwdL0nEH0uGom9no0nyB>

Week 3: Data Structures - Stacks and Queues

Learn about stacks and queues, their properties, and applications in problem-solving. Understand problems that can be solved using stacks and queues.

Resources:

- Stacks and Queues in Programming: <https://www.youtube.com/watch?v=wjl1WNcIntg>
- Stack Problems for Beginners: <https://www.youtube.com/watch?v=IhhyE7NVcbg&list=PLqM7aIHxFySF7Lap-wi5qlaD8OEBx9RM>

Week 4: Recursion and Backtracking

Learn the basics of recursion and backtracking and their applications in solving problems.

Understand how to solve complex problems by breaking them down into smaller sub-problems.

Resources:

- Recursion Explained: <https://www.youtube.com/watch?v=Mv9NEXX1VHc>
- Backtracking Algorithm Tutorial: <https://www.youtube.com/watch?v=DKCbsiDBN6c>

Week 5: Sorting and Searching Algorithms

Learn about sorting algorithms like Quick Sort, Merge Sort, and searching algorithms like Binary Search. Understand how to optimize solutions using these algorithms.

Resources:

- Sorting Algorithms Explained: <https://www.youtube.com/watch?v=4VqmGXwpLqc>
- Binary Search Tutorial: <https://www.youtube.com/watch?v=P3YID7liBug>

Week 6: Greedy Algorithms

Learn about greedy algorithms and how they are used to solve optimization problems. Understand the concepts of greedy choice property and optimal substructure.

Resources:

- Greedy Algorithm Introduction: <https://youtu.be/ilYwrsP7zzk?si=faBRwsbVB3Vq8KsT>
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- Greedy Algorithm Practice Problems: <https://www.youtube.com/watch?v=oTTzNMHM05I>

Week 7: Dynamic Programming - Part 1

Learn the basics of dynamic programming, including the concepts of overlapping subproblems and optimal substructure. Understand how to identify and solve dynamic programming problems.

Resources:

- Dynamic Programming Introduction: <https://www.youtube.com/watch?v=oBt53YbR9Kk>
- Beginner Dynamic Programming Problems: <https://www.youtube.com/watch?v=NnD96abizww>

Week 8: Dynamic Programming - Part 2

Explore more advanced dynamic programming problems.

Learn about problems like Knapsack, Longest Common Subsequence, and more.

Resources:

- Advanced Dynamic Programming Problems: <https://www.youtube.com/watch?v=Zb4eRjuPHbM>
- Solving DP Problems Efficiently: <https://www.youtube.com/watch?v=8LusJS5-AGo>

Week 9: Graph Theory Basics

Learn about graph theory concepts such as BFS, DFS, and shortest path algorithms. Understand how to represent graphs and solve graph-based problems.

Resources:

- Graph Theory for Beginners: <https://www.youtube.com/watch?v=pcKY4hjDrxk>
- BFS and DFS Explained: <https://www.youtube.com/watch?v=zaBhtODEL0w>

Week 10: Advanced Graph Algorithms

Learn about advanced graph algorithms such as Dijkstra's, Bellman-Ford, and Floyd-Warshall. Understand their applications in solving complex graph problems.

Resources:

- Dijkstra's Algorithm Explained: <https://www.youtube.com/watch?v=XB4MlexjvY0>
- Bellman-Ford Algorithm: <https://www.youtube.com/watch?v=obWXjtg0L64>

Week 11: Number Theory and Mathematics

Learn about number theory concepts like GCD, LCM, prime numbers, and modular arithmetic. Understand how to apply these concepts to solve competitive programming problems.

Resources:

- Number Theory for Competitive Programming: https://www.youtube.com/watch?v=RCq5TYMZEwg&list=PLauivoElc3giVROwL-6g9hO-LISen_NaV
- Modular Arithmetic in CP: <https://youtu.be/QEyhFzawMFw?si=6dkJtmubZ3LGwz8f>

Week 12: Contest Preparation and Practice

Learn strategies for participating in programming contests.

Practice solving problems on platforms like Codeforces, LeetCode, and HackerRank.

Resources:

Practicing Websites:

Leetcode- <https://leetcode.com/>

Hackerrank- <https://www.hackerrank.com/>