



PYTHON TRAINING

# Data Structure Algorithm Python Course

*Master Python data structures and algorithms to write efficient, optimized code for complex problems.*

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DURATION

**48 hours**

LEVEL

**Intermediate**

FORMAT

**Instructor-Led**

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- Globally Recognized Certification

- Expert-Led Hands-On Training

- Flexible Scheduling

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## COURSE OVERVIEW

This intermediate-level "Data Structure Algorithm Python Course" is meticulously designed to equip aspiring and professional developers with the foundational knowledge and practical skills necessary to write highly efficient, optimized, and scalable Python code. Participants will delve deep into the core concepts of data structures, such as arrays, linked lists, trees, graphs, and hash tables, understanding their underlying mechanisms and appropriate use cases. Concurrently, the course extensively covers essential algorithms, including various sorting, searching, recursion, and dynamic programming techniques, all implemented and analyzed within the versatile Python programming environment. This comprehensive approach ensures a robust understanding of how to manage and process data effectively.

The professional benefits of mastering data structures and algorithms are immense. This course not only enhances your problem-solving capabilities but also sharpens your ability to design and implement efficient solutions, a critical skill for any software development role. By understanding the time and space complexity of different approaches (Big O notation), you will learn to make informed decisions that impact application performance. Furthermore, this certification is a crucial stepping stone for individuals preparing for demanding technical interviews at leading tech companies, as well as those looking to advance into specialized fields like artificial intelligence, machine learning, and high-performance computing. Elevate your coding prowess and unlock new career opportunities with this essential Python-centric training.

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|----------|--------------|
| Duration | 48 hours     |
| Level    | Intermediate |
| Vendor   | Python       |

## COURSE CURRICULUM

### 01 Module 1: Foundations of Data Structures & Algorithms

- Python Refresher: Advanced Topics (Generators, Decorators)
- Introduction to Data Structures and Algorithms
- Algorithm Analysis: Time and Space Complexity (Big O, Omega, Theta Notations)
- Recursion and Iteration: Principles and Applications

### 02 Module 2: Linear Data Structures

- Arrays (Python Lists): Dynamic Arrays, Fixed-Size Arrays
- Linked Lists: Singly, Doubly, and Circular Linked Lists
- Stacks: LIFO Principle, Implementations and Applications
- Queues: FIFO Principle, Deques, Priority Queues

### 03 Module 3: Non-Linear Data Structures

- Trees: Binary Trees, Binary Search Trees (BST), AVL Trees (overview)
- Heaps: Min-Heaps, Max-Heaps, Heap Applications
- Hash Tables: Hashing Functions, Collision Resolution Techniques (Chaining, Open Addressing)
- Graphs: Representations (Adjacency Matrix, Adjacency List), Basic Properties

### 04 Module 4: Searching and Sorting Algorithms

- Searching Algorithms: Linear Search, Binary Search
- Sorting Algorithms: Bubble Sort, Selection Sort, Insertion Sort
- Efficient Sorting: Merge Sort, Quick Sort, Heap Sort
- Comparison of Sorting Algorithms and Their Complexities

## 05 Module 5: Advanced Algorithms and Techniques

- Graph Traversal: Breadth-First Search (BFS), Depth-First Search (DFS)
- Shortest Path Algorithms: Dijkstra's Algorithm (Introduction)
- Greedy Algorithms: Principles and Examples
- Dynamic Programming: Memoization, Tabulation, Common DP Problems

## 06 Module 6: Practical Applications and Interview Preparation

- Applying DS&A to Real-World Problems
- Techniques for Optimizing Code
- Mock Interview Scenarios with DS&A Questions
- Best Practices for Problem Solving and Code Submission

## CAREER PATHWAYS

Graduates of this program are prepared for the following roles:

- > **Optimized Software Developer (Python focus)**
- > **Algorithm Design Engineer**
- > **Technical Interview Candidate (for FAANG-level companies)**

## FREQUENTLY ASKED QUESTIONS

### **Q: What level of Python proficiency is required before enrolling in this Data Structure Algorithm Python Course?**

This course is tailored for intermediate-level learners. You should have a solid grasp of Python fundamentals, including variables, data types, control flow (if/else, loops), functions, and object-oriented programming (classes and objects). While the first module includes a brief review, prior hands-on experience in writing Python code is essential to fully benefit from the advanced concepts covered.

### **Q: How will this specific course enhance my performance in technical coding interviews, especially for roles at top tech companies?**

This course is explicitly designed to equip you for challenging technical interviews. You will master the critical data structures and algorithms frequently tested, learn how to analyze problem constraints, optimize solutions using Big O notation, and practice implementing efficient code in Python. The final module focuses entirely on interview strategies, common problem patterns, and mock scenarios, giving you the confidence and skills to ace the algorithmic sections of interviews at leading tech organizations.

### **Q: Beyond basic software development, what types of complex problems will I be able to solve efficiently after completing this Data Structure Algorithm Python Course?**

Upon completion, you'll be able to tackle complex computational problems that demand efficient resource utilization. This includes designing optimal solutions for large-scale data processing, pathfinding in complex networks (like in GPS or social networks), optimizing resource allocation, and developing high-performance search and recommendation systems. You'll gain the analytical framework to break down intricate problems and apply the most suitable data structures and algorithms to achieve scalable and robust solutions.

## ABOUT COMPUTER PRIDE



### *East Africa's Premier IT Training Center*

With over 15 years of excellence, Computer Pride delivers globally recognized certification programs from leading technology vendors. Located on Kenyatta Avenue in Nairobi's CBD, our state-of-the-art facilities and expert instructors have empowered thousands of professionals across East Africa.

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**10,000+**

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## READY TO ENROL?

Take the next step in your technology career.

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