



# Data Structures & Algorithms

for

**Absolute Beginners + Non-Tech Professionals**

15+ Projects, 30 Topics, 500+ Practice Questions



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## **The Roadmap is divided into 30 Sections**

- 1. Introduction and Basics of Python**
- 2. Operators**
- 3. Conditional Statements**
- 4. While Loops**
- 5. Lists**
- 6. Strings**
- 7. For Loop**
- 8. Functions**
- 9. Dictionary**
- 10. Tuples**
- 11. Set**
- 12. Object-Oriented Programming**
- 13. File Handling**
- 14. Exception Handling**
- 15. Regular Expression**
- 16. Modules and Packages**
- 17. Data Structures**
- 18. Higher-Order Functions**
- 19. Python Web Scrapping**
- 20. Virtual Environment**
- 21. Web Application Project**
- 22. Git and GitHub**
- 23. Deployment**
- 24. Python Package Manager**
- 25. Python with MongoDB Database**
- 26. Building API**
- 27. Statistics with NumPy**
- 28. Data Analysis with Pandas**
- 29. Data Visualization with Matplotlib**
- 30. What to do Now?**

# 1 | Introduction and Basics

- Installation
- Python Org, Python 3
- Variables
- Print function
- Input from user
- Data Types
- Type Conversion
- First Program

# 2 | Operators

- Arithmetic Operators
- Relational Operators
- Bitwise Operators
- Logical Operators
- Assignment Operators
- Compound Operators
- Membership Operators
- Identity Operators

# 3 | Conditional Statements

- If Else
- If
- Else
- El If (else if)
- If Else Ternary Expression

## 4 | While Loop

- While loop logic building
- Series based Questions
- Break
- Continue
- Nested While Loops
- Pattern-Based Questions
- pass
- Loop else

## 5 | Lists

- List Basics
- List Operations
- List Comprehensions / Slicing
- List Methods

## 6 | Strings

- String Basics
- String Literals
- String Operations
- String Comprehensions / Slicing
- String Methods

## 7 | For Loops

- Range function
- For loop
- Nested For Loops
- Pattern-Based Questions
- Break
- Continue
- Pass
- Loop else

## 8 | Functions

- Definition
- Call
- Function Arguments
- Default Arguments
- Docstrings
- Scope
- Special functions Lambda, Map, and Filter
- Recursion
- Functional Programming and Reference Functions

## 9 | Dictionary

- Dictionaries Basics
- Operations
- Comprehensions
- Dictionaries Methods

## 10 | Tuple

- Tuples Basics
- Tuples Comprehensions / Slicing
- Tuple Functions
- Tuple Methods

## 11 | Set

- Sets Basics
- Sets Operations
- Union
- Intersection
- Difference and Symmetric Difference

## **12 | Object-Oriented Programming**

- Classes
- Objects
- Method Calls
- Inheritance and Its Types
- Overloading
- Overriding
- Data Hiding
- Operator Overloading

## **13 | File Handling**

- File Basics
- Opening Files
- Reading Files
- Writing Files
- Editing Files
- Working with different extensions of file
- With Statements

## **14 | Exception Handling**

- Common Exceptions
- Exception Handling
- Try
- Except
- Try except else
- Finally
- Raising exceptions
- Assertion

## 15 | Regular Expression

- Basic RE functions
- Patterns
- Meta Characters
- Character Classes

## 16 | Modules & Packages

- Different types of modules
- Inbuilt modules
- OS
- Sys
- Statistics
- Math
- String
- Random
- Create your own module
- Building Packages
- Build your own python module and deploy it on pip

## 17 | Data Structures

### 0 | Data Structures & Algorithms Starting Point

Getting Started

Variables

Data Types

Data Structures

Algorithms

Analysis of Algorithm

Time Complexity

Space Complexity

Types of Analysis

Worst

Best

Average

Asymptotic Notations

Big-O

Omega

Theta

## **Data Structures**

1 | Stack

2 | Queue

3 | Linked List

4 | Tree

5 | Graph



## **Algorithms**

6 | List and Array

7 | Swapping and Sorting

8 | Searching

9 | Recursion

10 | Hashing

11 | Strings

12 | Dynamic Programming

Interviews Questions & Solutions

## **18 | Higher-Order Functions**

- Function as a parameter
- Function as a return value
- Closures
- Decorators
- Map, Filter, Reduce Functions

## **19 | Python Web Scrapping**

- Understanding BeautifulSoup
- Extracting Data from websites
- Extracting Tables
- Data in JSON format

## **20 | Virtual Environment**

- Virtual Environment Setup

## **21 | Web Application Project**

- Flask
- Project Structure
- Routes
- Templates
- Navigations

## **22 | Git and GitHub**

- Git - Version Control System
- GitHub Profile building
- Manage your work on GitHub

## **23 | Deployment**

- Heroku Deployment
- Flask Integration

## **24 | Python Package Manager**

- What is PIP?
- Installation
- PIP Freeze
- Creating Your Own Package

- Upload it on PIP

## **25 | Python with MongoDB Database**

- SQL and NoSQL
- Connecting to MongoDB URI
- Flask application and MongoDB integration
- CRUD Operations
- Find
- Delete
- Drop

## **26 | Building API**

- API (Application Programming Interface)
- Building API
- Structure of an API
- PUT
- POST
- DELETE
- Using Postman

## **27 | Statistics with NumPy**

- Statistics
- NumPy basics
- Working with Matrix
- Linear Algebra operations
- Descriptive Statistics

## **28 | Data Analysis with Pandas**

- Data Analysis basics
- Dataframe operations
- Working with 2-dimensional data
- Data Cleaning
- Data Grouping

## **29 | Data Visualization with Matplotlib**

- Matplotlib Basics
- Working with plots
- Plot
- Pie Chart
- Histogram

## **30 | What to do Now?**

- Discussions on how to process further with this knowledge.

## **Python Roadmap YouTube:**

<https://www.youtube.com/watch?v=2MGpqktN9BI>

## **Python WhatsApp Community Group:**

<https://chat.whatsapp.com/KKF0YYOtHqAJjKKP4V2RZp>

## **Data Science ML Full Stack:**

<https://github.com/hemansnation/God-Level-Data-Science-ML-Full-Stack>

## **Python for Beginner YouTube Playlist:**

[https://youtube.com/playlist?list=PLMk98arLoBfq2B6\\_EJb3dG2wAXQtd4dSN](https://youtube.com/playlist?list=PLMk98arLoBfq2B6_EJb3dG2wAXQtd4dSN)

## **Notes on Data, Product, and AI - Newsletter (11k Subscribers):**

<https://www.linkedin.com/build-relation/newsletter-follow?entityUrn=7014799989251956736>

## **Telegram:**

<https://t.me/+sREuRiFssMo4YWJl>

## **AI Jobs LinkedIn Group:**

<https://www.linkedin.com/groups/12540639/>