

# Python Basics – Complete Course Roadmap

## 1. Introduction & Description

- **What is Python?**

Python is a **high-level, interpreted, general-purpose programming language** known for its simplicity and readability. It is one of the most popular programming languages in the world, widely used in **web development, data science, machine learning, automation, scripting, and more.**

- **Why Python?**

1. Easy-to-learn syntax (beginner-friendly).
2. Versatile (can be used in almost every field).
3. Large standard library + third-party packages (via **pip**).
4. Strong community support.

- **Where is Python used?**

- Web development (Django, Flask)
  - Data science & machine learning
  - Scripting & automation
  - Game development
  - Artificial intelligence (AI)
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## 2. 10-Week Learning Roadmap

### Week 1: Introduction & Setup

- Installing Python
- Using IDLE / VS Code
- Your first program (`print("Hello, World!")`)
- Comments & basic syntax
- Variables & data types (int, float, str, bool)

✦ Mini Project → **Simple Calculator**

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### Week 2: Control Flow

- If-else statements
- Comparison operators
- Logical operators
- Nested conditions

✦ Project → **Grade Calculator**

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## Week 3: Loops & Iteration

- For loop, While loop
- Break & continue
- Range function
- Nested loops

✦ Project → **Multiplication Table Generator**

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## Week 4: Functions

- Defining functions
- Parameters & return values
- Default arguments
- Scope of variables

✦ Project → **Banking System (deposit/withdraw functions)**

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## Week 5: Data Structures – Lists & Tuples

- Creating lists & tuples
- Indexing & slicing
- List methods (append, insert, pop, remove)
- Tuple immutability

✦ Project → **Student Record Manager (with lists)**

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## Week 6: Data Structures – Dictionaries & Sets

- Key-value pairs in dictionaries
- Dictionary methods (get, update, pop)
- Sets & set operations (union, intersection)

✦ Project → **Contact Book using dictionaries**

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## Week 7: Strings & File Handling

- String methods (split, replace, find, join)
- Reading & writing files (open, read, write)
- Exception handling (try-except)

✦ Project → **Word Counter from a text file**

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## Week 8: Object-Oriented Programming (OOP)

- Classes & Objects
- Constructors (`__init__`)
- Inheritance
- Encapsulation & Polymorphism

✦ Project → **Library Management (with classes)**

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## Week 9: Modules & Packages

- Importing modules
- Built-in modules (math, random, datetime)
- Creating custom modules
- Using pip & installing packages

✦ Project → **Random Password Generator**

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## Week 10: Final Capstone Project

- Combine all concepts into a real project
    - ✦ **Capstone → Student Management System (Add, Update, Delete, Search students with file storage)**
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### 3. Interview Prep (Common Questions)

- What are Python's main features?
- Explain mutable vs immutable types.
- Difference between lists and tuples.

- What are Python modules and packages?
  - Explain OOP concepts in Python.
  - How does Python handle memory management?
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#### 4. Resources

- Official Docs: <https://docs.python.org>
- FreeCodeCamp Python Tutorials
- Automate the Boring Stuff with Python (Book)
- W3Schools Python Reference
- Python Crash Course (Eric Matthes, Book)