

Python Course Outline: Beginner to Intermediate

1. Introduction to Python

- What is Python and why use it?
- Installing Python and setting up IDEs (VS Code, PyCharm, Jupyter Notebook)
- Writing your first Python program: `Hello, World!`

2. Python Basics

- Variables and data types (int, float, string, bool)
- Input and output functions
- Basic operators (arithmetic, comparison, logical)

3. Control Flow

- Conditional statements (`if`, `elif`, `else`)
- Loops (`for`, `while`)
- Loop control (`break`, `continue`, `pass`)

4. Data Structures

- Lists, tuples, sets, dictionaries
- Indexing and slicing
- Common methods and operations

5. Functions

- Defining and calling functions
- Parameters and return values
- Scope and lifetime of variables
- Built-in functions vs. user-defined functions

6. Basic Projects

- Calculator program
- Number guessing game
- Simple to-do list

7. Working with Strings

- String methods and formatting
- f-strings
- Regular expressions (basic)

8. File Handling

- Reading and writing text files
- Working with CSV and JSON files
- Error handling with `try/except`

9. Modules and Packages

- Importing modules
- Standard library overview (`math`, `random`, `datetime`)
- Creating your own modules

10. Object-Oriented Programming (OOP)

- Classes and objects
- Attributes and methods
- Inheritance and polymorphism
- Encapsulation

11. Advanced Data Structures

- List comprehensions
- Nested data structures
- Collections module (`Counter`, `defaultdict`, `deque`)

12. Error and Exception Handling

- Common exceptions
- Custom exceptions
- Using `finally` and `else`

13. Intermediate Projects

- Contact book application
- Basic text-based adventure game
- File organizer script

Capstone Projects (Bridging to Advanced)

- Web scraper using `requests` and `BeautifulSoup`
- Data visualization with `matplotlib` or `seaborn`
- Mini banking system (OOP + file handling)