**🛣️ Python Learning Roadmap (2025 Edition)**

**🔰 Step 1: Basics of Python**

*Goal: Understand syntax, data types, and control flow*

* ✅ Install Python & IDE (VS Code / PyCharm)
* ✅ Hello World, Comments
* ✅ Variables and Data Types (int, float, str, bool)
* ✅ Type Casting
* ✅ Input/Output
* ✅ Operators (Arithmetic, Logical, Assignment, Comparison)

**🔁 Step 2: Control Flow**

*Goal: Make decisions and repeat code*

* ✅ if, elif, else
* ✅ for loops
* ✅ while loops
* ✅ break, continue, pass
* ✅ range(), nested loops

**📦 Step 3: Data Structures**

*Goal: Store and manage collections of data*

* ✅ Lists
* ✅ Tuples
* ✅ Sets
* ✅ Dictionaries
* ✅ List comprehensions

**🔧 Step 4: Functions & Modules**

*Goal: Reuse code effectively*

* ✅ Defining & Calling Functions
* ✅ Parameters & Return Values
* ✅ \*args and \*\*kwargs
* ✅ Lambda Functions
* ✅ Built-in Functions
* ✅ Creating & Importing Modules
* ✅ \_\_main\_\_ check

**📂 Step 5: File Handling**

*Goal: Work with files*

* ✅ Reading and Writing Text Files (open, read, write)
* ✅ with statement
* ✅ Working with CSV files (csv module)
* ✅ JSON Handling (json module)

**🧪 Step 6: Error Handling**

*Goal: Handle unexpected issues gracefully*

* ✅ try, except
* ✅ finally, else
* ✅ Raising exceptions
* ✅ Custom exceptions

**🎯 Step 7: OOP in Python**

*Goal: Write structured, reusable code*

* ✅ Classes & Objects
* ✅ \_\_init\_\_() Constructor
* ✅ Instance vs Class Variables
* ✅ Inheritance
* ✅ Method Overriding
* ✅ Encapsulation & Polymorphism
* ✅ @staticmethod, @classmethod

**🌐 Step 8: Intermediate Concepts**

*Goal: Think and code like a Pythonista*

* ✅ Iterators & Generators
* ✅ Decorators
* ✅ map(), filter(), reduce()
* ✅ List, Set, Dict Comprehensions
* ✅ zip(), enumerate()
* ✅ collections module

**🧰 Step 9: Useful Libraries & Tools**

*Goal: Power-up your Python projects*

* ✅ os, sys
* ✅ datetime
* ✅ math, random
* ✅ requests
* ✅ pandas, numpy (for data)
* ✅ tkinter (for GUI)
* ✅ pytest (for testing)

**🚀 Step 10: Build Projects**

*Goal: Apply everything you've learned*

* 📝 **To-do App (CLI)**
* 🗃️ **File Organizer**
* 📊 **Data Analyzer using Pandas**
* 📤 **Weather App using API**
* 🕹️ **Simple Game (like Tic-Tac-Toe)**

**📌 Bonus:**

* 💻 Try [PythonAnywhere](https://www.pythonanywhere.com/) or [Replit](https://replit.com/) for online coding
* 📚 Practice on [LeetCode](https://leetcode.com/), [HackerRank](https://hackerrank.com/), [Codewars](https://codewars.com/)
* 🧠 Learn Git & GitHub alongside