Learning Python

Curated RAG-Friendly Content

TeachMate Al Agent – Knowledge Base Upload

Prepared for: Retrieval■Augmented Generation (RAG) demos

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1. Introduction to Python

Python is a high∎level, general∎purpose programming language created by Guido van Rossum and first released in 1991.

Why Python?

- Simple, readable syntax
- Large standard library & vibrant ecosystem
- Cross■platform (Windows, macOS, Linux)
- Ideal for data science, web development, automation, and more

Python executes line by line (interpreted) but can be compiled to byte**■**code for performance.

2. Getting Started

- 1. Install Python 3.x from python.org or via package managers (e.g., Homebrew, apt).
- 2. Verify installation: \$ python --version
- 3. Use an IDE or text editor (VS Code, PyCharm) OR the built**■**in REPL by typing \$ python
- 4. Create virtual environments to isolate dependencies:

\$ python -m venv venv && source venv/bin/activate (Unix) venv\Scripts\activate (Windows)

3. Variables & Data Types

- Numbers: int, float, complex

- Boolean: True / False

- Strings: immutable sequences of Unicode characters

- Lists: ordered, mutable collections [1, 'a', 3]

- Tuples: ordered, immutable collections (1, 2)

- Sets: unordered, unique elements {1, 2, 3}

- Dicts: key■value pairs {'name': 'Ada', 'age': 30}

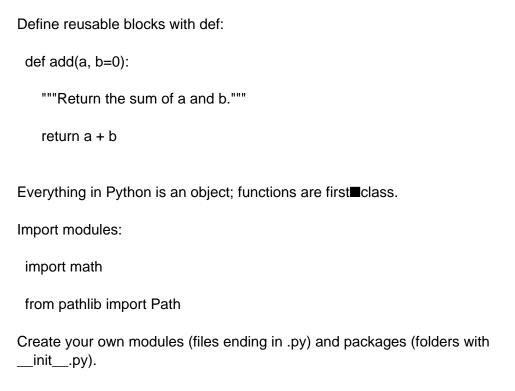
Python uses dynamic typing: variable types are determined at runtime.

4. Control Flow

Conditional statements:

Use 'break' to exit, 'continue' to skip to next iteration.

5. Functions & Modules



6. Core Data Structures

List comprehensions:

```
squares = [x^{**}2 \text{ for } x \text{ in range}(10)]
```

Dictionary comprehensions:

```
mapping = {c: ord(c) for c in 'abc'}
```

Built■in functions: len(), sorted(), enumerate(), zip(), map(), filter().

7. Object**■**Oriented Programming (OOP)

Python supports classes & multiple inheritance.

```
class Animal:
    def __init__(self, name):
        self.name = name
    def speak(self):
        raise NotImplementedError
class Dog(Animal):
    def speak(self):
    return 'Woof!'
```

Key concepts: encapsulation, inheritance, polymorphism, composition.

8. Popular Libraries

- NumPy & Pandas: data manipulation

- Matplotlib & Seaborn: visualization

- scikit∎learn: machine learning

- FastAPI, Django, Flask: web frameworks

- LangChain, OpenAI, transformers: LLM & NLP

- Streamlit & Gradio: data apps & demos

9. Next Steps & Resources

- Official Docs: docs.python.org/3/
- Interactive Tutorials: realpython.com | learnpython.org
- Books: 'Automate the Boring Stuff with Python', 'Fluent Python'
- Community: /r/Python, Python Discord, local meetups

Project Ideas:

- Build a CLI todo app
- Create a Streamlit dashboard
- Automate file organization
- Train a small ML model with scikit∎learn

Happy Coding!