Advanced Python Programming - Syllabus

Module 1: Python Internals & Memory Management

- Data structure

Module 2: Advanced Functions and Functional Programming

- Closures, decorators, lambdas

- map, filter, reduce, functools

Module 3: Object-Oriented Python (OOP Deep Dive)

- Dunder methods, __slots__

- Class decorators, metaclasses

- Abstract Base Classes, MRO

Module 4: Iterators, Generators, and Coroutines

- Custom iterable classes

- Generators, yield, send()

- Asyncio, async/await

Module 5: Concurrency and Parallelism

- threading, multiprocessing, asyncio

Module 6: Design Patterns in Python

- Singleton, Factory, Observer, Strategy
- Command, Proxy, Fluent interfaces

Module 7: Testing, Logging & Debugging

- unittest, pytest, mocking
- TDD, logging best practices
- pdb, cProfile

Module 8: File Handling, Serialization & I/O

- CSV, JSON, XML, Pickle, YAML
- pathlib, os, shutil

Module 9: Advanced Modules & Ecosystem Integration

- typing, mypy, sqlite3, sqlalchemy
- pydantic

Module 10: Real-World Project (Capstone)

- Choose from REST API, Web Crawler, ETL Pipeline
- Version control with Git, documentation with Sphinx
- Packaging with setuptools or poetry

Bonus Topics (Optional)

- Pandas, Numpy, Cython, Numba, Python C-API
- memory_profiler, line_profiler

Evaluation

- Quizzes and Assignments