Let’s Code

Python Course Structure (16 Weeks)

Week 0: Explore Miva Student Benefits for Miva Students

Lecture Topics:

- Github for Students
- Jetbrains for Students
- Figma for Students
- Notion for Students and how to use it for learning

Week 1: Introduction to Python and Programming Fundamentals

Lecture Topics:

- Course introduction and expectations
- Setting up Python development environment
- Basic syntax and interactive Python shell
- Variables, data types, and operators
- Basic input/output operations

Assignment:

- Create a personal information collector that takes user inputs and formats them into a profile
- Set up GitHub repositories for course projects

Week 2: Control Structures and Functions

Lecture Topics:

- Conditional statements (if, elif, else)
- Loops (for, while)
- Function definition and parameters
- Return values and scope
- Code organization and documentation

Project #1: Command-Line Calculator

- Design a calculator with multiple operations
- Implement error handling

- Create a menu-driven interface
- Add history features and memory functions

Week 3: Data Structures

Lecture Topics:

- Lists and list comprehensions
- Tuples and their applications
- Dictionaries and sets
- Choosing appropriate data structures
- Performance considerations

Assignment:

- Create a contact management system using appropriate data structures
- Implement search and filter functionality

Week 4: File Handling and Exceptions

Lecture Topics:

- Reading and writing text files
- Working with CSV and JSON
- Exception handling
- Context managers with with statement
- File system operations

Project #2: Data Analysis Tool

- Create a program that processes CSV/JSON data files
- Implement statistical calculations
- Generate summary reports
- Add data visualization using matplotlib
- Include error handling for corrupted data

Week 5: Object-Oriented Programming I

Lecture Topics:

- Classes and objects
- Attributes and methods
- Constructors and initialization
- Encapsulation principles
- Object lifecycle

Assignment:

- Design a library management system using OOP principles
- Implement classes for books, patrons, and transactions

Week 6: Object-Oriented Programming II

Lecture Topics:

- Inheritance and polymorphism
- Abstract classes and interfaces
- Method overriding
- Composition vs. inheritance
- Design patterns introduction

Project #3: Simple Game Development

- Create a text-based adventure or simple 2D game
- Implement game entities using inheritance
- Design game mechanics with appropriate patterns
- Add save/load functionality using serialization

Week 7: Modules, Packages, and Virtual Environments

Lecture Topics:

- Module creation and imports
- Package structure and organization
- Virtual environments with venv
- Dependency management with pip
- Distribution and packaging

Week 8: Testing and Debugging

Lecture Topics:

- Unit testing with pytest
- Test-driven development
- Debugging techniques
- Code coverage
- Documentation and doctest

Assignment:

- Add comprehensive tests to previous projects
- Document code with proper docstrings

- Perform peer code reviews

Week 9: Advanced Python Concepts

Lecture Topics:

- Generators and iterators
- Decorators and closures
- Context managers
- Functional programming concepts
- Advanced comprehensions

Project #4: Data Pipeline System

- Create a data processing pipeline with multiple stages
- Implement generators for memory efficiency
- Use decorators for logging and performance monitoring
- Add concurrent processing capabilities

Week 10: Database Integration

Lecture Topics:

- SQL fundamentals and database design
- SQLite and Python's sqlite3 module
- ORM concepts with SQLAlchemy
- CRUD operations
- Database migrations

Assignment:

- Extend a previous project to use database storage
- Implement data models and migration plans
- Add complex queries and reports

Week 11: Web Development I

Lecture Topics:

- Web fundamentals (HTTP, HTML, CSS basics)
- Flask framework introduction
- Routing and views
- Templates with Jinja2
- Forms and validation

Project #5: Personal Web Portfolio

- Create a Flask-based personal portfolio
- Implement multiple pages with navigation
- Add form-based contact functionality
- Deploy to a hosting service (optional)

Week 12: Web Development II

Lecture Topics:

- RESTful API design
- JSON Web Services
- Authentication and security basics
- Integration with databases
- API testing

Assignment:

- Extend web portfolio with an API
- Add authentication system
- Implement dashboard with data visualization

Week 13: Advanced Topics and Project Work

Lecture Topics (Choose based on class interest):

- Data Science with pandas and numpy
- Machine Learning basics with scikit-learn
- Concurrent programming (threading, multiprocessing)
- GUI development with Tkinter/PyQt
- DevOps and deployment

Final Project Work:

- Continued development of final projects
- Technical problem-solving sessions
- Progress presentations

Week 14: Project Presentations and Course Recap

Activities:

- Final project presentations
- Code demonstrations
- Peer evaluations
- Course review and next steps in Python development

- Career opportunities discussion