Python for AI Developers

9-Week Course Syllabus

Offered by **Vipracube AI Technologies**

Python | OOP | SQL | NumPy & Pandas | Async | FastAPI | Docker

Duration	9 weeks
Who is it for	Aspiring AI developers, students, and career switchers who need a strong Python foundation before moving to Machine Learning and Agentic AI.
Prerequisites	Basic computer literacy and logical thinking. No prior programming experience needed.
Outcome	Write clean, object-oriented Python; work with SQL databases; analyze data with NumPy and Pandas; integrate APIs; and build, test, and deploy FastAPI services ready for AI applications.

Course Roadmap

Module	Topics	Weeks
1. Core Python	Python basics, data structures, file handling, OOP, advanced Python	1 - 3
2. Data & Databases	SQL, SQLAlchemy ORM, NumPy, Pandas, data visualization	4 - 5
3. APIs & Python for AI Applications	API integration, async Python, automation, FastAPI	6 - 7
4. Professional Practices	Testing, Docker, CI/CD, deployment, capstone, career readiness	8 - 9

Module 1: Core Python

Weeks 1 - 3

Week 1: Python Basics

- Setting up the environment: Python, VS Code, virtual environments, pip, running scripts and the REPL
- Variables, data types, type conversion, operators, input/output
- Strings: formatting, slicing, and common methods
- Control flow: conditionals, loops, break/continue
- Introduction to Git and GitHub

Lab / Project: Console utilities (calculator, number guessing game, unit converter)

Week 2: Data Structures, Functions & File Handling

- Lists, tuples, sets, dictionaries: operations and use cases
- Functions: arguments, *args/**kwargs, return values, lambda, scope, recursion
- Comprehensions and built-ins (map, filter, zip, enumerate, sorted)
- File handling; working with JSON and CSV
- Exception handling
- Modules, packages, and the standard library (datetime, os, pathlib, random, collections)

Lab / Project: Contact book or expense tracker with file persistence

Week 3: OOP & Advanced Python

- OOP: classes, objects, constructors, instance vs class attributes, methods
- Inheritance, polymorphism, encapsulation, abstraction, dunder methods
- Iterators, generators, decorators, context managers
- Type hints, dataclasses, and Enum
- Clean code: PEP 8, docstrings, linting and formatting (Ruff/Flake8, Black)

Lab / Project: Mini Project 1 - Object-oriented Library, Inventory, or Banking system (CLI) with file persistence

Module 2: Data & Databases

Weeks 4 - 5

Week 4: SQL & Databases

- Relational database concepts, PostgreSQL/SQLite setup
- SQL: DDL/DML, SELECT, WHERE, ORDER BY, JOINs, GROUP BY, HAVING, subqueries
- Database design: normalization, primary/foreign keys, ER diagrams, indexes, transactions
- Python database access: sqlite3 and psycopg
- ORM with SQLAlchemy: models, sessions, relationships, Alembic migrations

Lab / Project: Design and query a student or e-commerce database; ORM-based inventory app

Week 5: Data Handling & Analysis with NumPy and Pandas

- Jupyter notebooks and the scientific Python ecosystem
- NumPy: arrays, indexing, broadcasting, vectorized operations
- Pandas: Series and DataFrames; loading CSV, Excel, JSON, and SQL data
- Data cleaning: missing values, duplicates, type conversion, outliers, text cleaning with regular expressions
- Data manipulation: filtering, groupby, merging/joining, pivot tables
- Visualization with Matplotlib and Seaborn; exploratory data analysis (EDA)

Lab / Project: Mini Project 2 - Clean, analyze, and visualize a real-world dataset; store the results in a SQL database

Module 3: APIs & Python for AI Applications

Weeks 6 - 7

Week 6: API Integration, Async Python & Automation

- Consuming REST APIs with requests/httpx: JSON, headers, authentication, pagination, error handling
- Rate limits, retries, and timeouts
- Managing API keys and secrets: environment variables and .env files (python-dotenv)
- Asynchronous Python: asyncio, async/await, concurrent API calls; threading vs multiprocessing overview
- Web scraping with BeautifulSoup: parsing, ethics, and robots.txt
- Automation: scripts, scheduling with cron/Task Scheduler, automated reports

Lab / Project: Async data collector that pulls data from multiple public APIs and stores it in a database

Week 7: FastAPI for AI Applications

- FastAPI: routing, path and query parameters, request bodies
- Pydantic models: validation, response models, and settings management
- Dependency injection, middleware, and error handling
- Async endpoints, background tasks, and streaming responses
- Integrating FastAPI with SQLAlchemy and a database
- API security basics: API keys, JWT authentication, password hashing
- Testing APIs with Swagger UI and Postman

Lab / Project: Mini Project 3 - Backend API with database and authentication (e.g., analytics API or document/task manager API)

Module 4: Professional Practices & Capstone

Weeks 8 - 9

Week 8: Testing, Docker & Deployment

- Testing with pytest: fixtures, parametrization, mocking, coverage; FastAPI TestClient
- Debugging and logging
- Project structure, dependency management (requirements.txt, pyproject.toml), and configuration
- Docker: images, containers, and docker-compose (app + database)
- CI/CD with GitHub Actions
- Cloud deployment (Render/AWS/Azure): environment variables, Uvicorn/Gunicorn

Lab / Project: Containerize and deploy Mini Project 3 with automated tests running in CI

Week 9: Capstone & Career Readiness

- Project planning: requirements, data/database design, API design
- Team Git workflow: branches, pull requests, and code review
- Problem solving and DSA essentials: arrays, strings, hashing, sorting, searching, recursion, stacks/queues
- Python interview preparation: core Python, OOP, SQL, data handling, and API design
- Resume, GitHub portfolio, and LinkedIn; mock interviews
- Next steps: pathway to Machine Learning, Deep Learning, and Agentic AI development
- Capstone demos, presentations, and feedback

Lab / Project: Capstone Project - Build, deploy, and present a Python data/API application

Capstone ideas: Data analytics platform with automated data collection and a REST API; expense tracker with reports and analytics API; web-scraping data pipeline with a query API; document/file processing service (upload, parse, store, search); job-listings aggregator with search API.

Assessment Structure (Suggested)

Component	Weightage
Weekly assignments / labs	30%
Mini Projects 1, 2 & 3	25%
Mid-course quiz (end of Week 5)	10%
Capstone project	35%

Tools & Tech Stack

Python 3, VS Code, Jupyter, Git/GitHub, SQLite/PostgreSQL, SQLAlchemy, NumPy, Pandas, Matplotlib/Seaborn, requests/httpx, BeautifulSoup, FastAPI, Pydantic, pytest, Docker, GitHub Actions, Postman.

Enroll / Contact

Vipracube AI Technologies

For more details, please contact: **9960923965**