

KOENIG SOLUTIONS · COURSE OUTLINE

Modern Python Web API Development with FastAPI

Learn to build, secure, test and deploy REST APIs with Python and FastAPI, from basic routing to database-backed, containerised applications.

5 Days

DURATION

10

MODULES

37

TOPICS

11

HANDS-ON LABS

COURSE OVERVIEW

This course begins with Python programming fundamentals before introducing FastAPI, including type hints, routing, and path and query parameters. It then covers Python object-oriented concepts alongside Pydantic models, request validation, dependency injection and modular routing. The course moves on to connecting FastAPI applications to SQL databases with SQLAlchemy, performing CRUD operations, and adding middleware, event hooks and structured app layouts. It concludes with authentication using OAuth2 and JWT, password hashing, unit testing with pytest, and deploying a Dockerised FastAPI project.

WHO THIS COURSE IS FOR

Python Developers

Backend Developers

API Developers

Software Engineers

Web Developers

PREREQUISITES

- Knowledge of API and Python Programming

LEARNING OBJECTIVES

- Apply core Python syntax, data types and control structures
- Implement functions, exception handling and object-oriented concepts
- Build REST API endpoints with FastAPI and path and query parameters
- Apply Pydantic models for request and response validation
- Configure dependency injection and modular routers in FastAPI
- Implement database operations with SQLAlchemy and CRUD endpoints
- Configure middleware, event hooks and structured application layers
- Implement authentication with OAuth2, JWT and password hashing

10 Modules, 37 Topics

DAY 1

Python Programming Essentials and Fast API

01

Python Programming Basics

TOPICS

Python Syntax, Data Types, Variables · Lists, Dictionaries, Sets, and Tuples · Conditional Statements and Loops · Functions and Lambda Expressions · Exception Handling (try, except, raise)

02

4 hours

2 Labs

Getting Started with FastAPI

TOPICS

Introduction to FastAPI and REST APIs · Python Type Hints Overview · Installing FastAPI and Uvicorn · Creating your first FastAPI App (Hello World) · Understanding GET, POST Requests · Path & Query Parameters

DAY 2

Python OOP + FastAPI Data Handling & Routing

03

Python OOP Concepts

TOPICS

Classes, Objects, Inheritance · Constructors and `__init__` method · Method Overriding · Practical use in API structures

04

3 Labs

FastAPI Models & Routing

TOPICS

Pydantic Models for Request/Response · Field Validation and Aliases · Dependency Injection with `Depends()` · Error Handling and Status Codes · FastAPI Routers (modular app structure)

DAY 3

Database, Middleware, and Async Operations

05

Connecting Python with SQL

TOPICS

Intro to SQLAlchemy ORM · SQLite/MySQL Integration with Python

06

FastAPI with Databases

TOPICS

Sync vs Async DB connections · SQLAlchemy Models and DB Session · CRUD Operations with SQLAlchemy · Database Initialization on App Start · Environment Variables (dotenv)

07

3 Labs

Middleware & App Structure

TOPICS

- Using Middleware (CORS, Logging)
- Event Hooks: startup and shutdown
- Structuring large apps with services, repositories

DAY 4

Authentication, Testing, and Deployment

08

Authentication & Security

TOPICS

OAuth2 & JWT Basics · Secure Password Hashing (bcrypt) · Login, Register, Protected Routes

09

Testing & Deployment

TOPICS

Writing Unit Tests with pytest · Deploy FastAPI

10

3 Labs

Docker & Project Capstone

TOPICS

- Dockerizing FastAPI App (Basics)
- Final Project: ToDo / Blog / Inventory API (includes auth, DB, and modular routes)

HANDS-ON LABS

Practise What You Learn

#	MODULE	ACTIVITY
02	Getting Started with FastAPI	■ Build basic Python scripts with loops, functions, error handling ■ Create a basic FastAPI app with query/path parameters
04	FastAPI Models & Routing	■ Create Pydantic models and validate user input ■ Use OOP to structure reusable logic in FastAPI ■ Modularize API routes using routers
07	Middleware & App Structure	■ Setup SQLite/MySQL DB with SQLAlchemy ■ Perform CRUD operations from API ■ Add middleware for logging and CORS

#	MODULE	ACTIVITY
10	Docker & Project Capstone	■ Implement secure login system with JWT ■ Write unit tests for API endpoints ■ Dockerize and deploy your API locally

WHAT IS INCLUDED

Everything You Need to Succeed

- Koenig course material for every module
- Delivery by certified instructors and subject matter experts
- Hands-on exercises throughout the course
- Course completion certificate from Koenig

ABOUT KOENIG

Who We Are

Established in 1993, Koenig Solutions is a globally recognised training provider with 35+ technology partnerships, 5,000+ training programmes and a network of certified instructors and subject matter experts, supporting individuals and enterprise teams worldwide.

FLEXIBLE DELIVERY

Learn the Way That Suits You

Classroom Training

Live Online Classes (ILO)

Fly-Me-A-Trainer (FMAT)

Flexi (Self-Paced)

1-on-1 Training

Ready to Get Started?

Talk to a learning advisor about schedules, group training and customised delivery.

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