

HackForge

Generative AI Application Development with Python

60 Hours

Phone :9884789292

Module 1: Introduction to Artificial Intelligence (3 Hours)

- Introduction to AI, ML, Deep Learning, and Generative AI
 - Evolution of Artificial Intelligence
 - Large Language Models (LLMs)
 - Popular AI Models (GPT, Llama, Qwen, DeepSeek, Gemma)
 - Open Source vs Commercial AI Models
 - AI Use Cases Across Industries
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Module 2: Understanding Large Language Models (4 Hours)

- Transformer Architecture Overview
 - Tokens and Tokenization
 - Context Window
 - Temperature, Top-P, Top-K
 - Prompt Completion Process
 - Model Parameters
 - AI Model Limitations
 - Hallucinations and Mitigation
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Module 3: Prompt Engineering (5 Hours)

- Prompt Engineering Fundamentals
- Zero-shot Prompting
- One-shot Prompting

- Few-shot Prompting
 - Chain of Thought Prompting
 - Role-based Prompting
 - Structured Prompt Design
 - JSON Output Generation
 - Prompt Optimization Techniques
 - Prompt Security
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Module 4: Running Open Source LLMs Using Ollama (4 Hours)

- Installing Ollama
 - Running Local LLMs
 - Downloading Models
 - Model Management
 - Ollama REST API
 - Ollama Python Library
 - Model Performance Comparison
 - Resource Requirements
 - Best Practices
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Module 5: Python for Generative AI (4 Hours)

- Virtual Environments
 - API Development Basics
 - HTTP Requests
 - JSON Processing
 - File Handling
 - Exception Handling
 - Async Programming
 - Python Libraries for AI
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Module 6: FastAPI for AI Applications (6 Hours)

- FastAPI Fundamentals
- REST API Development

- Request and Response Models
 - File Upload APIs
 - Background Tasks
 - Async Programming
 - Calling Ollama
 - Streaming Responses
 - API Documentation
 - Error Handling
 - Authentication
 - Deployment Basics
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Module 7: OpenAI API Integration (4 Hours)

- OpenAI SDK
 - Chat Completion APIs
 - Responses API
 - Image Generation APIs
 - Function Calling
 - Structured Outputs
 - Token Usage
 - Cost Optimization
 - Rate Limits
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Module 8: Embeddings and Vector Databases (5 Hours)

- What are Embeddings?
 - Text Vectorization
 - Semantic Search
 - ChromaDB
 - FAISS
 - Pinecone Overview
 - Similarity Search
 - Metadata Filtering
 - Index Management
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Module 9: Retrieval-Augmented Generation (RAG) (6 Hours)

- Introduction to RAG
 - Document Loading
 - Text Chunking
 - Embedding Generation
 - Vector Storage
 - Retrieval Techniques
 - Context Injection
 - Multi-document Search
 - RAG Pipeline Design
 - Building Document Chatbots
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Module 10: AI Agents and Automation (5 Hours)

- Introduction to AI Agents
 - Tool Calling
 - Agent Memory
 - Planning and Execution
 - Multi-Agent Systems
 - MCP (Model Context Protocol) Introduction
 - AI Workflow Automation
 - Agent Design Patterns
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Module 11: Real-Time AI Application Development (8 Hours)

- AI Chatbot
- AI Coding Assistant
- AI MCQ Generator
- AI Interview Question Generator
- AI Resume Analyzer
- AI Content Generator
- AI Document Summarizer
- AI Translation Tool
- AI FAQ Assistant
- AI Learning Assistant

Module 12: Production Deployment and Scaling (3 Hours)

- Deploying AI Applications
 - Docker Basics
 - Nginx Configuration
 - Gunicorn
 - VPS Deployment
 - Environment Variables
 - Logging
 - Monitoring
 - Performance Optimization
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Module 13: Production Best Practices (3 Hours)

- Prompt Versioning
 - AI Security
 - API Security
 - Cost Optimization
 - Caching
 - Background Processing
 - Queue Management
 - Error Handling
 - Monitoring AI Applications
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Module 14: Capstone Project (5 Hours)

Students will develop a complete Generative AI application from scratch using the concepts covered throughout the course.

Project Options:

- AI Coding Tutor
- AI Interview Preparation Platform
- AI Resume Analyzer
- AI Document Question Answering System
- AI Learning Management Assistant
- AI Content Generation Platform

- AI Customer Support Chatbot
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Technologies Covered

- Python
- FastAPI
- Ollama
- OpenAI APIs
- ChromaDB
- FAISS
- LangChain (Introduction)
- Hugging Face (Introduction)
- Docker
- Nginx
- Git & GitHub
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