

Generative AI + Agentic AI with Python & LangGraph

8-Week Professional Curriculum (32 Hours)

Course Overview

- Duration: 8 Weeks
- Total Hours: 32 Hours
- Python-based AI Engineering Program
- Covers Generative AI + Agentic AI
- Agentic AI Framework: LangGraph
- Includes 4 Industry-Level Capstone Projects

Section	Weeks	Hours
Python Foundations	1	4
Generative AI	3	12
Agentic AI with LangGraph	4	16

Week 1 — Python Foundations for AI Engineering

Students learn Python programming required for AI engineering, APIs, JSON handling, functions, OOP, and modular coding.

Topics Covered:

- Python ecosystem for AI development
- Variables, loops, functions, dictionaries
- API handling with requests library
- JSON parsing and file handling
- Introduction to Object-Oriented Programming
- Hands-on chatbot and API projects

What Students Will Master:

Students can confidently write Python programs for AI applications.

Week 2 — Foundations of Generative AI & LLMs

Students understand how Large Language Models work internally and how Generative AI systems generate intelligent responses.

Topics Covered:

- Evolution of AI and Generative AI
- LLMs, tokens, embeddings, context windows
- Transformer architecture and attention mechanism
- Semantic search and vector embeddings
- Using Hugging Face and APIs for text generation

What Students Will Master:

Students can run LLMs using Python and understand transformer-based AI systems.

Week 3 — Prompt Engineering & GenAI Application Development

Students learn prompt engineering and how to create real AI applications using orchestration frameworks.

Topics Covered:

- Zero-shot and few-shot prompting
- Chain-of-thought prompting
- Persona engineering and system prompts
- Introduction to LangChain
- Building AI content generators and summarizers
- Creating Streamlit-based AI interfaces

What Students Will Master:

Students can build structured AI workflows and production-style GenAI applications.

Week 4 — RAG Systems & GenAI Capstone Projects

Students learn Retrieval-Augmented Generation (RAG) and build document-aware AI systems.

Topics Covered:

- Understanding hallucination problems
- Embeddings and vector databases
- FAISS and ChromaDB

- PDF chatbot architecture
- End-to-end RAG pipeline development

What Students Will Master:

Students can build deployable RAG applications with external knowledge retrieval.

Week 5 — Introduction to Agentic AI & LangGraph

Students transition from GenAI applications to autonomous AI agents using LangGraph.

Topics Covered:

- What is Agentic AI?
- AI agents vs chatbots
- ReAct and planning agents
- LangGraph nodes, edges, and states
- Building first tool-using AI agent

What Students Will Master:

Students can create graph-based AI workflows and basic AI agents.

Week 6 — Stateful Agents, Memory & Tool Usage

Students learn to create intelligent agents with memory and dynamic tool execution.

Topics Covered:

- StateGraph architecture
- Memory systems
- Function calling and tool integration
- Conditional routing and branching logic
- Multi-tool assistants

What Students Will Master:

Students can build memory-enabled AI agents with dynamic reasoning.

Week 7 — Multi-Agent Systems & Autonomous Workflows

Students build collaborative AI systems where multiple agents coordinate tasks.

Topics Covered:

- Planner, executor, and reviewer agents
- Task decomposition and autonomous planning
- Human-in-the-loop workflows
- Agent tracing and debugging
- Autonomous Research Agent capstone

What Students Will Master:

Students can build autonomous multi-agent systems with planning workflows.

Week 8 — Advanced Agentic AI Systems & Final Capstone

Students build enterprise-grade Agentic AI systems using advanced LangGraph architectures.

Topics Covered:

- Reflection and self-correcting agents
- Scalability and persistence
- Deployment fundamentals
- Docker introduction
- Multi-Agent Customer Support System capstone

What Students Will Master:

Students can develop scalable production-ready AI agents.

Capstone Projects

AI Research Assistant

Build a PDF-based RAG assistant with semantic search and contextual Q&A.;

AI Content Studio

Create AI-powered blog, email, and LinkedIn content generators.

Autonomous Research Agent

Develop a planning and research agent using LangGraph.

Multi-Agent Customer Support System

Build a collaborative multi-agent support workflow with memory.

Final Skills Acquired

- Prompt Engineering
- LLM Application Development
- Retrieval-Augmented Generation (RAG)
- Embeddings & Semantic Search
- LangChain Workflows
- LangGraph State Management
- Multi-Agent Architectures
- Memory-Enabled AI Agents
- Autonomous AI Systems
- AI Deployment Fundamentals