

# PG Certificate in Generative AI Prompt Engineering & Agentic AI

Duration- 5 Days



# Syllabus

## Day 1: Foundations of Agentic AI & Intelligent Agents

- Topics:
  - Evolution: From LLMs to Agents
  - What makes an agent *agentic*? (Planning, Memory, Tool Use, Goals)
  - Agent Types: Reflex, Model-based, Goal-based, Utility-based, Learning Agents
  - Overview of Agentic AI applications and real-world use cases
  - Structured prompting for agents: ReAct, Chain-of-Thought (CoT), Toolformer, self-reflection
- Hands-on Labs:
  - Compare agent architectures: LangChain, CrewAI, AutoGen
  - Design structured prompts for agentic workflows
- Assignment:

Build a simple agent for file exploration or task automation

## Day 2: Agentic Prompt Engineering & Single-Agent Systems

- Topics:
  - Agentic prompt engineering basics: system vs. user prompts, prompt evaluation, optimization
  - Designing tool-using agents: function calling, external tool integration
  - Memory, context, and dynamic prompt generation for agents
  - Implementing single-agent systems with LangChain Agents, CrewAI, AutoGen
- Hands-on Labs:
  - Build a LangChain agent for document QA
  - Implement a goal-driven agent using CrewAI or AutoGen
- Assignment:
  - Develop a prompt-based agent for a real-world task (e.g., summarization, data extraction)

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## Day 3: Multi-Agent Systems & Orchestration

### Topics:

- Multi-agent collaboration: Agent2Agent (A2A) communication, coordination, and memory sharing
- Knowledge graphs and RAG agents in multi-agent settings
- Orchestration frameworks: LangChain, LangGraph, CrewAI, AutoGen
- Safety, trust, and staged execution in agentic architectures

### Hands-on Labs:

- Build a multi-agent sales assistant with CrewAI
- Design a research assistant using plan-and-execute with AutoGen

### Assignment:

- Deploy a LangChain-based multi-agent bot for a business use case

## Day 4: Advanced Agentic Orchestration & Local Model Integration

### Topics:

- Orchestrating agentic workflows with MCP, LangChain, LangGraph, CrewAI
- Integrating local LLMs (Ollama) and fast inference (GROQ) with agentic frameworks
- Logging, observability, and governance: LangSmith, sandboxing
- Real-time, event-driven agentic systems

### Hands-on Labs:

- Build a chain-of-thought agent with MCP + GROQ
- Implement a collaborative task manager using MCP + A2A

### Assignment:

- Develop and deploy a local RAG agent with Ollama

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## Day 5: Capstone Project & Responsible Agentic AI

### Topics:

- Capstone: Design, build, and demo a real-world agentic AI solution (e.g., multi-agent RAG system, legal advisory assistant, financial insight bot)
- Responsible AI: Fairness, bias, risk, and compliance for agentic systems
- Guardrails and evaluation for agentic AI (Guardrails.ai, IBM AIF360)

### Hands-on Labs:

- Capstone project work: team setup, toolstack, MVP development, demo
- Implement guardrails and evaluate agentic system for bias and safety

### Assignment:

- Final project presentation and code submission

# Assessment

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- Quizzes, subjective and coding assignments (40%)
- Mini projects & labs (30%)
- Capstone evaluation (30%)

# Expanded Hands-On Case Studies for Agentic AI

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**Day 1: Agentic Knowledge Retrieval Bot for IT Helpdesk**

**Day 2: Agentic Prompt Engineering for Legal Document QA**

**Day 3: Multi-Agent Financial Report Assistant**

**Day 4: Chain-of-Thought Agent for Research Planning**

**Day 5: Capstone – Multi-Agent RAG System for Legal Advisory**

**Visit us at:**

Synthlinx LLC  
3185 Pond Mist Way, Herndon, VA 20171, USA

Synthlinx Private Limited  
#2105 Ground Floor, 4th Main, 5th Cross, 8th Phase, Royal County, JP Nagar,  
Bengaluru - 560078, India

<https://synthlinxglobal.com//> [Info@synthlinx.com](mailto:Info@synthlinx.com) // Ph No-+91 9538150299

# Thank you