deerwalk
training center

DTA-AAI-101

Agentic AI with Python

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Program Information

Nature of the Course
Lecture + Hands-on Labs

Total Hours per Day
60 hours

Course Duration
6 Weeks

Course Summary

This syllabus outlines the structure, content, and requirements of the Agentic AI and Autonomous Systems course. The design emphasizes conceptual clarity, hands-on implementation, and real-world agent development using modern AI frameworks within a hybrid learning environment.

Completion Criteria

After fulfilling all of the following criteria, the student will be deemed to have finished the module:

- Has attended 90% of all classes held.
- Has received an average of 80% on all assignments
- Has received an average of 60% in assessments.
- The tutor believes the student has grasped all of the concepts and is ready to go on to the second module.

Prerequisites

- Fundamental programming knowledge in Python, including experience from an AI bootcamp
- Basic understanding of data structures.

Course Details

Module 1: Introduction to Agentic AI (3 Hours)

- Definition of Agentic AI
- Difference between AI, Generative AI, and Agentic AI
- Why agents (beyond chatbots)
- Real-world enterprise & startup use cases
- Limits of autonomy

Module 2: Foundations of AI & Machine Learning (4 Hours)

- Definition of Agentic AI
- Difference between AI, Generative AI, and Agentic AI
- Why agents (beyond chatbots)
- Real-world enterprise & startup use cases
- Limits of autonomy

Module 3: Large Language Models (LLMs) (6 Hours)

- What are LLMs
- Transformer architecture basics
- Prompt engineering fundamentals - System prompts, ReAct, Plan–Execute, Reflection
- Limitations and hallucinations in LLMs
- Cost & latency awareness

Module 4: Agent Architectures & Design Patterns (6 Hours)

- Reactive vs deliberative agents
- Goal-based & utility-based agents
- Agent lifecycle
- Sense–Think–Act loop
- Stateless vs stateful agents
- Control loops & stopping conditions

Module 5: Reasoning, Planning & Decision Making (6 Hours)

- Definition of Agentic AI
- Difference between AI, Generative AI, and Agentic AI
- Why agents (beyond chatbots)
- Real-world enterprise & startup use cases
- Limits of autonomy

Module 6: Memory, RAG & Knowledge Systems (5 Hours)

- Short-term vs long-term memory
- Episodic vs semantic memory
- Vector databases and embeddings
- Retrieval-Augmented Generation (RAG)
- Context management for agents
- Memory summarization & forgetting

Module 7: Tool Use & API Integration (5 Hours)

- Using tools with AI agents
- API calling and function execution
- Database and file system integration
- Error handling and safety checks

Module 8: Multi-Agent Systems (4 Hours)

- Introduction to multi-agent systems
- Agent collaboration and communication
- Hierarchical and swarm agents

Module 9: Agent Frameworks (6 Hours)

- LangChain: AgentExecutor, Custom tools, Memory integrations, Callback system
- LangGraph: State machines for agents, Long-running agents, Cycles & branching

Module 10: Testing, Evaluation & Optimization (3 Hours)

- Agent behavior testing
- Performance evaluation metrics
- Debugging agent workflows
- Improving reliability and accuracy

Module 11: Deployment, Ethics & Security (3 Hours)

- Deploying agents (local, Docker, VM-ready patterns)
- Monitoring and logging
- Ethical considerations in Agentic AI
- Security risks and mitigation

Module 12: Fine tuning LLMs (5 Hours)

- Fine-Tuning Fundamentals
- Hugging Face Trainer
- PEFT / LORA

Module 13: Capstone Project (4 Hours)

- Designing a real-world AI agent
- Tool integration and memory usage
- Project presentation and evaluation

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