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ACADEMY

Generative AI Training Course

CURRICULUM

Module I – Core Concepts in Generative AI

- What is Artificial Intelligence?
- What is Generative AI?
- Generative vs Discriminative Models
- Neural Networks Introduction
- RNNs, LSTMs, GRUs
- Attention Mechanism
- Transformer Architecture
- Encoder, Decoder, and Encoder-Decoder Models
- Autoencoders and Variational Autoencoders (VAEs)
- Latent Space Representations
- Generative Adversarial Networks (GANs)
- Diffusion Models (Stable Diffusion concepts)
- Evolution of Generative Models over Time

Module II – NLP Foundations for GenAI

- Introduction to NLP
- Text Preprocessing and Tokenization
- N-grams, Bag-of-Words, TF-IDF
- Word Embeddings (Word2Vec, GloVe)
- Introduction to BERT
- Introduction to GPT Models
- Sentence Embeddings and Document Embeddings
- Hugging Face NLP Pipelines
- Modern Tokenization: BPE, WordPiece, SentencePiece
- NLP Evaluation Metrics

Module III – Prompt Engineering

- What is Prompt Engineering?
- Components of an Effective Prompt
- Zero-Shot, One-Shot, Few-Shot Prompting
- Chain-of-Thought (CoT) Prompting
- Role Prompting and Contextual Prompting
- ReAct: Reasoning + Acting
- Retrieval-Augmented Prompting
- Self-Consistency Prompting
- Tree of Thought (ToT) Prompting
- Guardrails, Safety Prompts, and Fail-safe Design
- Prompt Injection and Defense Strategies
- Designing Prompts for Code, Reasoning, and Creativity

Module IV – Large Language Models (LLMs)

- What is an LLM?
- LLM Architecture
- Attention and Multi-Head Attention
- Token Embeddings, Positional Embeddings
- LLM Parameters and Scaling Laws
- Popular LLM Architectures: GPT, Claude, LLaMA, Gemini
- LoRA, QLoRA, and PEFT Techniques
- RLHF: Reinforcement Learning from Human Feedback
- LLM Distillation
- Evaluation of LLM Outputs
- Using LLM APIs (OpenAI, Hugging Face, Gemini)
- Understanding Context Length and Window Limitations

Module V – Retrieval-Augmented Generation (RAG)

- Concept of RAG in AI Systems
- When and Why to Use RAG
- RAG Architecture and Workflow
- Embeddings for Retrieval
- Vector Databases Overview
- FAISS
- ChromaDB
- Qdrant
- Pinecone
- Document Splitting and Chunking
- Query Engines and Retriever Types
- RAG with LangChain
- RAG with LangGraph
- Multimodal RAG (text → image/video)
- Evaluation of RAG Systems
- Optimizing RAG for Latency and Accuracy

Module VI – Agentic AI & Multi-Agent Systems

- What is Agentic AI?
- Traditional AI Pipelines vs Agentic Systems
- Agent Architecture (planner, memory, executor)
- Types of Memory (episodic, long-term, summarization)
- Action Execution with External Tools
- Multi-Agent Collaboration
- Agent-to-Agent Communication Patterns
- Model Context Protocol (MCP)
- Popular Agent Frameworks
- Designing Safe and Stable Agent Behavior

Module VII – CrewAI & Multi-Agent Orchestration

- Introduction to CrewAI
- Crew Roles and Task Distribution
- Tool Usage in CrewAI
- Creating Custom Tools
- Memory in CrewAI (short-term, long-term)
- Embeddings inside Crew Framework
- Knowledge Systems in CrewAI
- Planning, Reasoning, and Delegation
- CrewAI CLI for Automation
- CrewAI Flow for Workflow Design
- Case Study: Fraud Detection Using CrewAI
- Building Multi-Agent Teams for Real Use-Cases

Module VIII – Automation with Agents & Deployment

- Agentic RAG Overview
- Agentic RAG with LlamaIndex
- Introduction to n8n for Automation
- Automating Workflows and Pipelines
- Automated Email Classifier with n8n
- Creating Business Automations with Agents
- Deployment Techniques for GenAI Apps
- Gradio
- Streamlit
- FastAPI
- Monitoring, Logging, and Observability
- Model Versioning and Rollbacks

Module IX – Responsible & Ethical AI

- Bias in Generative Models
- Dataset Bias and Mitigation
- Deepfakes and Synthetic Media
- Prompt Injection Attacks
- Jailbreak Attacks on LLMs
- Safety Protocols for LLM Applications
- Explainability and Transparency
- Responsible AI Frameworks
- Global AI Governance (EU AI Act, India AI Policies)
- Ethical Model Deployment and Monitoring

Module X – LangChain for LLM Application Development

- Introduction to LangChain Framework
- Prompt Templates, Chains, and Tools
- Agents in LangChain
- Retrieval with LangChain (RAG Pipelines)
- Memory Types in LangChain
- Working with LangChain Expression Language (LCEL)
- Integrating Vector Databases (FAISS, Pinecone, Chroma)
- Building Multi-Step Workflows
- Deployment of LangChain Apps
- Hands-On: Build a Full RAG Application

Module XI – LangGraph for Agentic Workflows

- What is LangGraph and Why It Exists
- Nodes, Edges, and State
- Designing Graph-Based AI Agents
- Persistence and Memory Handling
- Multi-Agent Orchestration Using LangGraph
- State Machine Design for LLM Agents
- Error Handling and Guardrails in Workflows
- LangGraph vs LangChain: When to Choose Which
- Hands-On: Build a Stateful Multi-Agent System

Module XII – LangFlow for No-Code/Low-Code GenAI

- Introduction to LangFlow UI
- Visual Node-Based Workflow Creation
- Building Prompts, Chains, and RAG Flows Visually
- Custom Component Creation
- Integration with Vector DBs & APIs
- Rapid Prototyping of GenAI Apps
- Deployment Options
- Hands-On: Create a Visual RAG App

Module XIII – LlamaIndex for Indexing & RAG Systems

- Core Concepts of LlamaIndex
- Index Types (Vector, Keyword, List, Tree)
- Storage Context and Service Context
- Query Engines and Retrievers
- Agentic RAG with LlamaIndex
- Integrating Structured + Unstructured Data
- Advanced RAG Techniques (Fusion, Re-Ranking)
- LlamaIndex vs LangChain: Strengths & Weaknesses
- Deployment Best Practices
- Hands-On: Build Production-Grade RAG with LlamaIndex

Thank You!

Thank you for downloading our curriculum! We're excited to be part of your learning journey. Feel free to reach out if you need more information.

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