# Practical Generative AI

28 hour Training Program

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## Pre-requisites

1. Participants should be hands-on with Python
2. Having basic knowledge of Data Science and algorithms is a plus
3. Participants should be conversant with some development tools - either command line or IDE

## Lab requirements

1. Ubuntu System with UI
2. VS Code
3. Aws or Azure AI Subscription

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# Agenda

**Module 1: Introduction to Generative AI (2 Hours)**

- Introduction to Generative AI and its Significance
- Overview of Key Developments in Generative AI
- Discriminative AI vs Generative AI
- Prompt Engineering Overview
- Popular Implementations: ChatGPT, Google Bard, DALL-E, OpenAI, Azure OpenAI

Hands On:

Quick Demo on LLM Model Playground

**Module 2: Core Concepts in Generative AI (2 Hours)**

Deep Learning Overview

- Understanding Sequential Models
- Introduction to Transformers
- Attention Mechanism and Transformer-Based Models (e.g., BERT, GPT)
- CNN for Image Generation and Style Transfer

**Module 3: Generative Models Deep Dive ( 8 Hours )**

- Langchain for GAI Applciations
- Feature Engineering with text data
- Using multiple LLMs (Chains)
- Working with Data loaders - Ingesting documents
- Working with text splitters - Chunking Data
- Working with Chains (Conversational Retrieval QA, Retrieval QA, Summarization, API etc.)
- Working with Memory
- Working with Embedding

Hands on:

- Using multiple LLMs (Chains)
- Working with Data loaders - Ingesting documents
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- Working with Chains (Conversational Retrieval QA, Retrieval QA, Summarization, API etc.)
- Working with Memory
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**Module 4: Prompt Engineering [4 Hours]**

- LLM Settings in Playground

- Basics of Prompting
- Prompt Elements
- General tips for designing prompts
- Prompt Engineering Techniques
    - Zero-shot prompting
    - Few shot Prompting
    - Role prompting
    - Chain-of-Thought Prompting
    - ReAct Prompting
    - Multimodal CoT Prompting
- Applications of Prompt Engineering
- Prompt Engineering Best Practices
- Prompt Cleaning node to node communications

**Hands On:**

- Prompt Engineering Techniques
    - Zero-shot prompting
    - Few shot Prompting
    - Role prompting
    - Chain-of-Thought Prompting
    - Automatic Reasoning and Tool-use (ART)
    - ReAct Prompting
    - Multimodal CoT Prompting

**Evaluating and Debugging Prompts**

- Metrics for Evaluating Prompt Effectiveness
- Common Pitfalls and How to Avoid Them
- Debugging Unexpected Model Outputs
- Logging with logging Module for Debugging

**Agentic AI Introduction [4 Hours]**

- What is Agentic AI?
- GenAI vs Agentic AI
- Memory and State
- Autonomy & decision making
- Adaptive Learning & Self-correction
- Tools

**Agentic AI with Lang graph**

- Custom tools
- Interact Lambda/Azure Functions
- Conversation with a ReAct agent

- Chatbots with LangGraph
- Adding Functions and Tools
- LLM Working with real time data
- Graph memory for conversations
- Mutli-agent systems with langgraph

Hands On:

- Chatbots with LangGraph
- Adding Functions and Tools
- LLM Working with real time data
- Graph memory for conversations
- Mutli-agent systems with langgraph

**Responsible AI [2 Hours]**

- Identifying and Addressing Biases in AI
- Ensuring Responsible and Ethical AI Use
- Securing AI Models with Azure Data Security
- Guardrails

Hands-On Lab:
Securing AI Models on Azure/AWS

**MCP [4 Hours]**

- Agent to Agent communications
- MCP Architecture
- Implement Custom MCP Server using Langchain
- Integrate MCP Server in LangGraph
- Explore MCP Servers Marketplace
- Different use cases of MCP servers

**Summary, wrap-up, Q&A** *[2 Hours]*

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