SYLLABUS

ARTIFICIAL INTELLIGENCE & DATA SCIENCE · COURSE HANDOUT 2026

GENERATIVE AI (BEGINNER TO ADVANCED)

NGUAGE MODELS . EMBEDDI
PROMPTING . AGENTS . FINE
T . IMAGE . AUDIO GENERATI

DURATION	LEVEL	MODULES	MODE
80 Hours	**Beginner to Advanced**	**10**	**Classroom · Online · Hybrid**

01 COURSE OVERVIEW

A single track that starts with no AI background and ends with a deployed generative AI application. The course explains what generative models are, how transformers produce text, and how the surrounding tools — embeddings, vector stores, agents and fine-tuning — fit together. Concepts are introduced where they are needed for the build in that module.

Learners work in Python on Google Colab with the OpenAI, Anthropic and Hugging Face APIs, and finish with a working assistant of their own choosing.

WHO IT IS FOR

- Beginners with basic computer skills
- Developers new to AI work
- Students in engineering, science and MCA streams
- Professionals evaluating AI for their teams

PREREQUISITES

No AI background required. Basic Python is helpful and is revised in Module 2.

02 LEARNING OUTCOMES

01 Describe how generative models are trained and served.

02 Write Python that calls hosted and open models.

03 Design prompts that produce consistent structured output.

04 Build a retrieval pipeline over private documents.

05 Generate images, speech and audio alongside text.

06 Deploy an AI application with Streamlit or FastAPI.

07 Recognise cost, privacy and hallucination risks.

03 MODULE STRUCTURE

10 MODULES

01 INTRODUCTION TO GENERATIVE AI

- What is Generative AI
- AI vs ML vs Deep Learning
- Discriminative vs generative models
- Where generative AI is used
- Model families
- Limitations and risks

LAB

COLAB SETUP | FIRST API CALL

02 PYTHON ESSENTIALS FOR AI

- Data types
- Control flow
- Functions
- Files and JSON
- Virtual environments
- Working with APIs

LAB

REQUESTS AND JSON PARSING | ENVIRONMENT VARIABLES

03 HOW LANGUAGE MODELS WORK

- Tokens
- Embeddings
- Attention
- Transformer blocks
- Context windows
- Temperature and sampling

LAB

TOKENISER EXPLORATION | EMBEDDING SIMILARITY

04 PROMPT ENGINEERING

- Zero-shot
- Few-shot
- Chain-of-thought
- Role and system prompts
- Structured output
- Prompt chaining

LAB

PROMPT LIBRARY | OUTPUT VALIDATION

05 WORKING WITH MODELS AND APIS

- OpenAI API
- Anthropic API
- Hugging Face Inference
- Open models locally
- Streaming responses
- Rate limits and cost

LAB

MODEL COMPARISON HARNESS

06 RETRIEVAL-AUGMENTED GENERATION

- Document loading
- Chunking
- Embedding models
- Vector databases
- Semantic search
- Context injection

TOOLS

LANGCHAIN **LLAMAINDEX** **CHROMADB**

LAB

PDF CHATBOT

07 AI AGENTS AND TOOLS

- Agent loop
- Tool calling
- Function calling
- Memory
- Planning
- Multi-agent basics

TOOLS

LANGGRAPH **CREWAI**

LAB

RESEARCH AGENT

08 FINE-TUNING AND CUSTOMISATION

- When to fine-tune
- Dataset preparation
- Supervised fine-tuning
- LoRA and QLoRA
- Evaluation
- Cost trade-offs

LAB

LORA FINE-TUNE ON HUGGING FACE

09 MULTIMODAL GENERATION

- Image generation
- Image editing
- Speech to text
- Text to speech
- Video basics
- Vision models

TOOLS

STABLE DIFFUSION · WHISPER · ELEVENLABS

10 DEPLOYMENT AND FINAL PROJECT

- Streamlit
- Gradio
- FastAPI
- Environment secrets
- Basic monitoring
- Cost control

PROJECT

AI ASSISTANT OF THE LEARNER'S CHOICE, DEPLOYED AND DOCUMENTED

04 ASSESSMENT & CERTIFICATION

Module assignments and labs	**25%**
Mini projects	**20%**
Internal assessments	**15%**
Final project and review	**40%**

CERTIFICATION

Learners who complete all modules, submit the final project and clear the review receive a course completion certificate from Kaizen Infinities Private Limited. Project work is documented for the learner's portfolio, and interview preparation is included in the closing sessions.

05 CAREER OUTCOMES

ROLES THIS PROGRAMME PREPARES FOR

GENERATIVE AI DEVELOPER · AI APPLICATION ENGINEER · PROMPT ENGINEER · PYTHON AI DEVELOPER · AI AUTOMATION SPECIALIST · TECHNICAL AI CONSULTANT

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