

GENERATIVE AI

1 Week in Campus Residential Program

COURSE CURRICULUM

Introduction

This program has been designed to provide a holistic learning experience. The curriculum balances theoretical knowledge and hands-on practice, ensuring participants gain both foundational understanding and practical expertise. Interactive sessions, real-world use cases, and collaborative hackathons help embed key concepts effectively. The structured flow, from basic concepts to advanced applications, caters to diverse learning paces while promoting teamwork and problem-solving. This methodology ensures a robust, engaging, and outcome-driven learning journey for all participants.

Duration

1 Week – Residential Program

9th – 15th March 2026

Venue

Indian Institute of Technology Goa



For any queries:
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Day 1 – Foundations of Generative AI

Topics

- 1. Introduction to AI, ML & Deep Learning**
 - Evolution of Generative AI
 - Understanding Generative Models
 - Generative vs Discriminative
 - Latent space, embeddings, representations
- 2. Overview of Modern Models**
 - GANs
 - VAEs
 - Diffusion Models
 - LLMs

Hands-on

- Setting up Python + PyTorch/TF environment
- Simple text & image generation demos using pre-trained models

Day 2 – Large Language Models (LLMs)

Topics

- Transformer Architecture (Attention, Multi-head Attention, Decoders/Encoders)
- How LLMs work internally
- Prompt Engineering Basics
- Tokenization & model inference pipelines
- Open-source LLMs (LLama 3, Mistral, GPT models, Phi models)

Hands-on

- Running LLMs locally
- Basic prompt engineering tasks
- Creating a Q&A chatbot using HuggingFace models

Day 3 – Fine-Tuning & Customization of LLMs

Topics

- Why & When to Fine-tune
- Fine-tuning Techniques:
 - Full fine-tuning
 - LoRA / QLoRA
 - PEFT (Parameter Efficient Fine Tuning)
 - Retrieval Augmented Generation (RAG)
 - Vector Stores (FAISS, Chroma)
 - Embeddings
 - Knowledge-base Integration

Hands-on

- Fine-tuning an LLM for a custom domain dataset
- Building a RAG-based assistant

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Day 4 – Image, Video & Multimodal Generative AI

Topics

- Diffusion Models (Stable Diffusion, SDXL)
- Text-to-Image, Image-to-Image
- Generative Video Models (Sora, Pika)
- Audio & Speech Generation
- Multimodal Models
- CLIP
- LLaVA
- GPT-4o style models

Hands-on

- Generate images using Stable Diffusion
- Build a multimodal captioning model
- Simple audio generation demo

Day 6 – Capstone Project + Industry Sessions + Evaluation

Activities

Capstone Project (Group Activity):

Choose one:

- Custom Chatbot for Institution/Business
- Image Generation Application
- RAG-based Document Assistant
- AI Agent for Workflow Automation
- Multimodal App (image + text)

Industry Expert Lecture / IIT Guwahati Faculty Session

- Project Presentation & Evaluation
- Feedback & Certification Ceremony

Deliverables / Takeaways

- Certificate of Completion (Joint certificate of Alchringa IIT Guwahati & Bsates)
- Source Code for all labs
- Deployed GenAI applications
- Project Portfolio for career use

Day 5 – Applications, Deployment & MLOps for GenAI

Topics

- Real-world Applications
- EdTech, Healthcare, FinTech, Robotics, Marketing
- AI Agents & Workflow Automation
- Model Optimization
- Quantization
- Distillation
- Deployment Techniques
- API deployment
- Dockerization
- FastAPI/Streamlit integration
- Ethics, Safety, Bias, Evaluation Metrics

Hands-on

- Deploy a GenAI app on a local/Cloud server
- Create an interactive GenAI-based web application