



Executive Program in

Applied AI (Generative AI & Agentic AI)

4 Months Program | Certificate by E&ICT, IIT Roorkee



About IIT Roorkee & EICT

IIT Roorkee (IITR) has been ranked the best among IITs, as per the QS World Best Universities Ranking 2019. E&ICT-IITR provides certification courses with emphasis on hands-on learning in basic and advanced topics and emerging technologies in Electronics and ICT. It is sponsored by the Ministry of Electronics and Information Technology, Govt. of India.



#1st

Among the IITs in the
'Citations per Faculty'
parameter
*QS World Rankings



#5

Ranked Engineering College
*India Today 2020



#6

Ranked for IITs
*NIRF 2020



#12

Ranked Best Global
Universities in India
*QS World Rankings



Prof. Sanjeev Manhas

Coordinator E-Learning Centre
IIT Roorkee

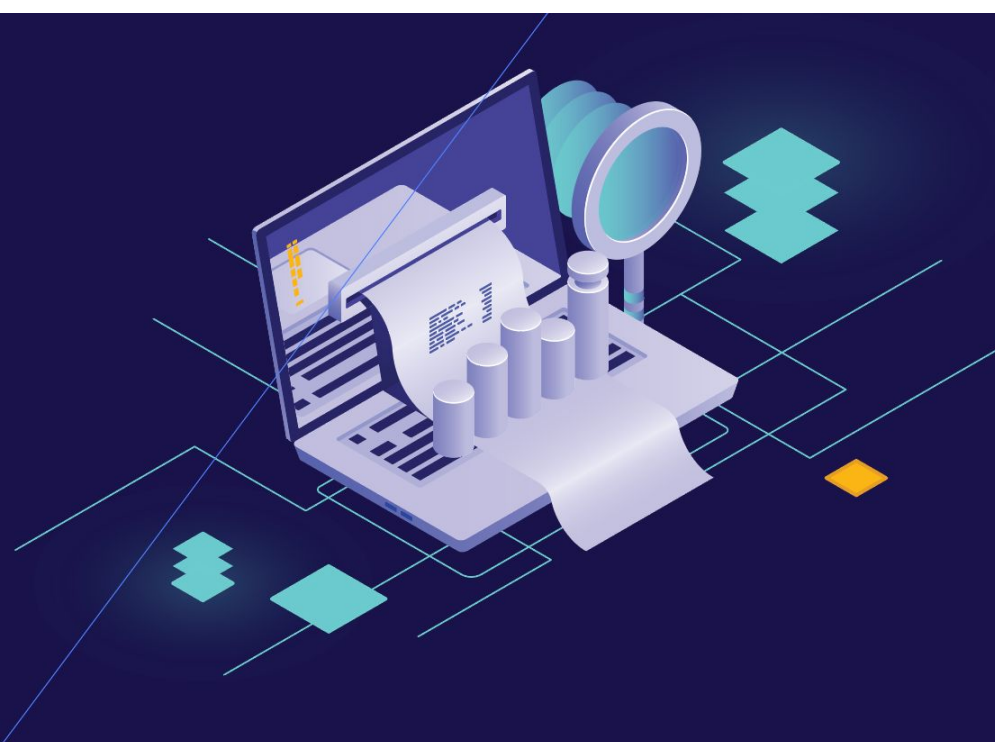
CloudxLab & Course

Cloudxlab is a team of developers, researchers, and educators who create gamified learning experiences for users. The company upskills engineers in deep tech to make them employable & future-ready. Cloudxlab is proud to collaborate with EICT-IITR to empower learners to solve complex problems with this Data Science course.

Our Students Work At



and more!



Sandeep Giri

Founder at CloudxLab

Why CloudxLab & IIT Roorkee



Earn certificate from IIT Roorkee.



Learn, Gen AI, Agentic concepts from IIT Roorkee professor and industry experts and become expert in AI domain



Online cloud lab for hands-on for real-world experience



Best-in-class support Throughout your learning journey



Lifetime course access



Work on real-world projects.



Interact with the international community of peers via the discussion forum.

Mentors / Faculties



Prof. Sanjeev Manhas

Faculty ECE Dept,
IIT Roorkee

Course Instructor

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Sandeep Giri

Founder at CloudxLab
Past: Amazon, InMobi, D.E.Shaw

Course Developer

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Abhinav Singh

Co-Founder at CloudxLab
Past: Byjus

Course Developer

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Praveen Pavithran

Co-Founder at Yatis
Past: YourCabs, Cypress Semiconductor

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Venkat Karun

Staff Software Engineer
Google

Course Advisor

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Shubh Tripathi

ML Engineer
CloudxLab

Course Instructor

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Learning Path



Beginning of
the course

(3 Weeks)



Basics:- Git,
Linux,
Python, SQL

(3 Weeks)



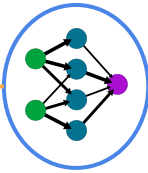
ML Libraries and
Mathematical
Concepts

(1 Weeks)



Reinforcement
Learning

(3 Weeks)



Deep
Learning

(3 Weeks)



Machine
Learning

(3 Weeks)



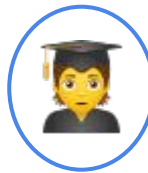
Generative
AI and LLMs



Real-World
Projects



Business Case
Study and
Interview
preparation



Get Certified
by IIT Roorkee

Course Curriculum

1. Python for Generative AI

- Introduction to Python
- Hands-on using Jupyter on CloudxLab

2. Machine Learning Applications & Landscape

- Introduction to Machine Learning
- Machine Learning Applications
- Different types of Machine Learning - Supervised, Unsupervised, Reinforcement

3. Building end-to-end Machine Learning Project

- Frame the problem and look at the big picture
- Get the data
- Explore the data to gain insights
- Prepare the data for Machine Learning algorithms
- Explore many different models and short-list the best ones
- Present the solution, Launch, monitor, and maintain the system

4. How does a Machine Learn?

- Introduction to Neural Networks
- Working of Neural Networks

5. Introduction to Natural Language Processing

- How model generates word
- Applications of Natural Language Processing

Course Curriculum

6. Word Embeddings

- How machines represent words?
- Significance of embeddings
- Similarity measures of embeddings
- Sentiment Analysis with LLMs – **Live Project**

7. Generative Pre-trained Transformer(GPT)

- Attention Mechanism
- Transformer Architecture and components
- Transfer Learning
- Building your own GPT from scratch using Tensorflow – **Live Project**

8. Introduction to Generative AI & Large Language Models (LLMs)

- How LLMs works
- Attention Mechanism
- Transformer Architecture
- Generative Pre-Trained Transformers
- Building your own Chat-GPT from scratch
- Applications of LLMs in business automation

9. Parameters configuration for LLMs(ChatGpt, Gemini, Claude.. etc)

10. How to get the best out of LLMs

Course Curriculum

11. Reasoning Models

- Reasoning Vs Non-Reasoning Models
- Auto-Reasoning (Models decides whether to reason)
- How to choose the right LLM for your task and its configuration

12. Prompt Engineering for Effective AI Utilization

- Components of a well-structured prompt
- Zero-shot and few-shot learning techniques
- Chain-of-thought prompting for complex reasoning
- Crafting high-impact prompts for better AI responses

13. Understanding RAG (Retrieval-Augmented Generation)

- What is RAG and why it matters
- RAG Architecture
- How AI retrieves and processes external information
- Components such as vector databases, chunking, etc (overview)

14. Introduction to AI Agents & Decision-Making AI

- What are AI agents and how they work
- How AI agents reason, take decisions, and automate workflows
- Creating Custom Tools and Integrating with AI agents

15. AI Agent Architectures & Workflows

- Single-agent vs. multi-agent architectures
- Chain of agents: How AI agents collaborate and interact
- Human in the Loop systems
- Project: Building an end-to-end AI agent without code (Using Framework)

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Course Curriculum

16. MCP (Model Context Protocol)

- Overview

17. Tools and Frameworks

- LangChain, LlamaIndex, LangGraph
- Autogen, CrewAI, n8n
- Ollama, Hugging Face, OpenAI Agent Kit

18. Stable Diffusion

- Introduction to Stable Diffusion
- Stable Diffusion Components
- Diffusion Model
- Stable Diffusion Architecture and Training

19. Multi-Modal AI & Common AI Business Tools

- Introduction to multi-modal LLMs (text + image interpretation & generation)
- How Multi-Model Architecture works

20. Capstone Project

Projects ---

1. Building end-to-end Machine Learning Project

- In this project we will build a machine learning model to predict housing prices using California Housing data.. We will learn various data manipulation, visualization and cleaning techniques using various libraries of Python like Pandas, Scikit-Learn and Matplotlib. This project covers building a Machine Learning project end-to-end.

2. Performing Sentiment Analysis with LLMs

- In this project, we will use **OpenAI embeddings** to conduct sentiment analysis on customer reviews. By exploring the capabilities of LLMs, we aim to extract nuanced sentiment from textual data, providing valuable insights for businesses to enhance customer satisfaction and decision-making.

3. Building your own GPT from scratch using Tensorflow

- In this project we will build our GPT from scratch. Then we will train it on the **Shakespeare** data. The result will be a language model capable of generating text with a distinctive Shakespearean flair.

4. Building a RAG based chat agent with Langchain and OpenAI

- In this project, we'll integrate RAG (Retriever-Augmented Generation) with Langchain to develop a sophisticated chat agent. Leveraging Chroma as a vector store, we'll store and retrieve relevant data based on user inquiries. This data will be seamlessly passed to GPT, enabling the generation of accurate and contextually relevant responses to customer queries.

5. Building a RAG based chat agent web app using Flask

- Create a user-friendly web application using Flask that integrates our RAG-based chat agent that we created in the previous project. Users can interact with the chat agent directly on the web, asking questions and receiving responses generated by advanced language models.

6. Building a Text to SQL Query Generator using Langchain

- This project enables the generation of SQL queries from natural language prompts. By providing the database schema and the user's query, the system utilizes GPT to generate SQL queries tailored to the user's needs. Execute the generated queries on your MySQL database effortlessly, simplifying the process of retrieving data through intuitive natural language interactions.

7. Developing a Voice-Controlled RAG Chat Agent App

- This project extends our existing RAG-based chat agent to incorporate voice commands. By integrating **text-to-speech** and **speech-to-text** functionalities, users can engage in voice conversations with the chat agent. Enhance user experience and accessibility by enabling intuitive voice interactions, fostering seamless communication between the customer and the chat agent.

Projects

8. Group mobile app reviews to generate clean actionable insights

- This project focuses on **clustering** mobile app reviews to extract meaningful insights. Through clustering techniques, we'll organize reviews into groups, allowing us to identify key areas for improvement or action. By analyzing these insights, our company can prioritize enhancements and address user concerns effectively, fostering continual improvement and enhancing user satisfaction with our mobile app.

9. Building an OpenAI agent to automate daily tasks

- Build your own **OpenAI-powered assistant** to tackle daily tasks. Choose routines, train on your language, and watch it streamline your life. Ideal for busy professionals and AI enthusiasts.

10. Building a QR Code AI Art Generator

- This project aims to generate QR codes with artistic designs. By leveraging the **Midjourney** and **DALL-E** APIs, we'll infuse creativity into QR code generation, transforming them into visually appealing artworks.

11. Building an image editor to edit images using text

- This project focuses on creating an application for editing images using natural language commands. Leveraging the Midjourney and DALL-E APIs, users can manipulate images through text input, enabling intuitive editing processes.

Course Details and Fees —

Please find more information about the course and fees here:

<https://cloudxlab.com/course/211/post-graduate-certification-in-applied-data-science-and-ai-iit-roorkee>

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