eict
IIT Roorkee

masai

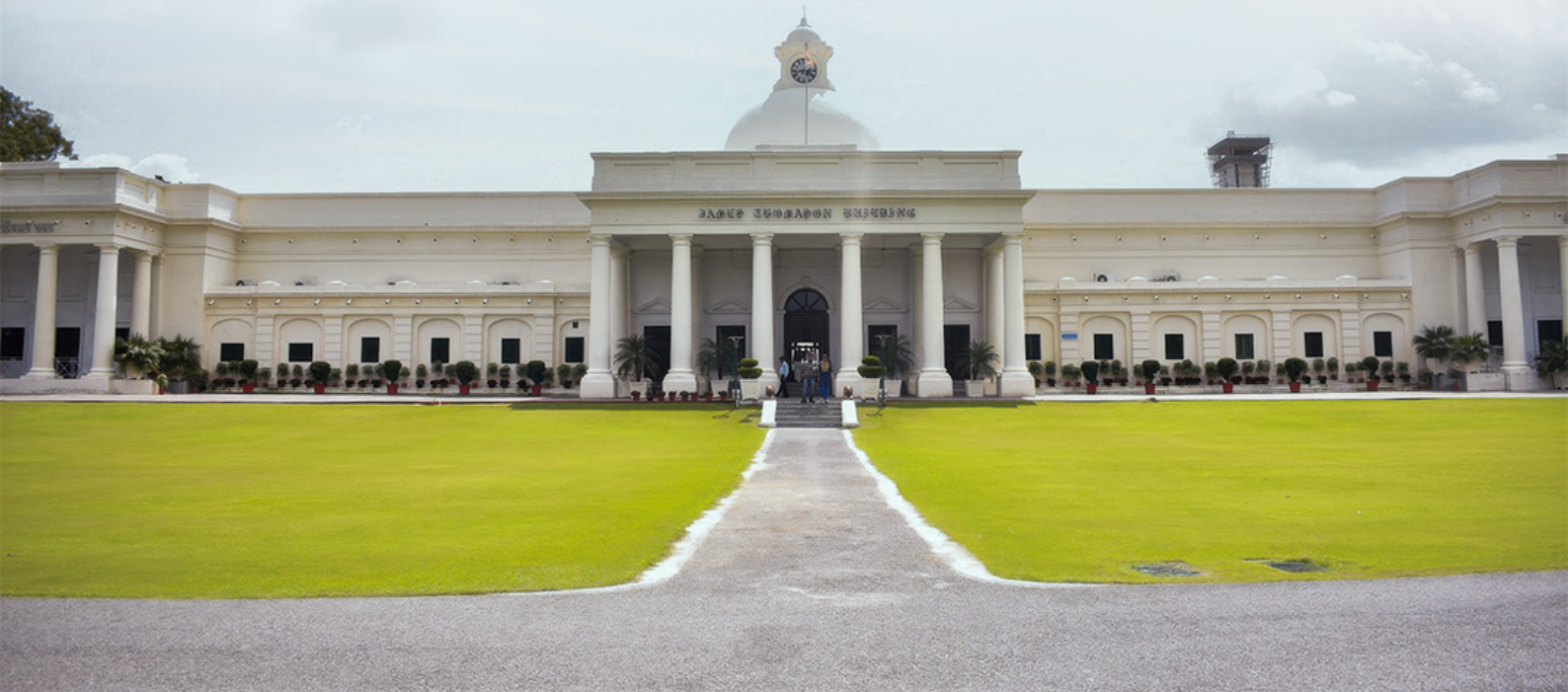
ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING CERTIFICATION PROGRAM

FROM E&ICT ACADEMY, IIT ROORKEE

In association with masai

About E&ICT Academy, IIT Roorkee

- **The Electronics & ICT Academy (E&ICT)**, supported by MeitY, Govt. of India, aims to bridge the gap between industry demand and academic knowledge by delivering specialized, hands-on training and upskilling programs in emerging areas of the Information & Communication Technology and Electronics sector.
- **The Indian Institute of Technology (IIT) Roorkee:** A legacy of over 175 years. Established in 1847 as India's first engineering college, it became an IIT in 2001, excelling in engineering and technology.
- **Rankings:** IIT Roorkee consistently ranks among the top engineering and research institutions in India. In the NIRF India Rankings 2024, IIT Roorkee was ranked #6 in the 'Engineering' category and #8 in the 'Overall' category.
- **Strong Industry & Research Ecosystem:** With active collaborations, incubators, and innovation hubs, IIT Roorkee bridges academia and industry to drive real-world impact.
- **Industry-Focused Learning:** IIT Roorkee maintains strong ties with industries across its campus locations, providing students with opportunities for internships, real-world projects, and networking with business leaders.



Why Choose This Course?

- **Prestigious Certification:** Earn a Certificate of Completion from E&ICT Academy, IIT Roorkee, recognizing your learning and achievement
- **Campus Immersion:** Optional 3-day campus immersion to interact with faculty/experts, peers, and the institute ecosystem.
- **Future-Proof Career Gateway:** Build in-demand AI & ML skills through hands-on learning guided by expert faculty and industry practitioners
- **Industry-Aligned Curriculum:** Learn cutting-edge AI & Machine Learning through interactive sessions, coding exercises, and structured evaluations.
- **Project-Based Learning:** Work on hands-on projects across Python, data handling, ML, and Generative AI, apply LLM concepts, LangChain workflows, and deployment to solve real-world problems.
- **Career Support* (via Masai):** Resume reviews, career coaching, and placement assistance to support your job search

**Eligibility: 65% attendance & 70% overall marks*

What Will You Learn?

Drive your career forward by mastering Artificial Intelligence and Machine Learning. Build a strong foundation in Python, data handling with NumPy and Pandas, and data visualization. Advance to core ML models, supervised and unsupervised learning, ensemble methods, and model optimization. Gain hands-on expertise in Generative AI, LLM integration, prompt engineering, agentic AI concepts, and MLOps basics, culminating in a portfolio-ready capstone project that equips you to solve real-world, AI-driven business challenges.

Toolkit

python™ Gemini pandas OpenAI matplotlib

CO learn Claude seaborn

Course Details

Course Duration	Time Commitment	Certification
6 Months	8-10 hours per week	E&ICT Academy, IIT Roorkee

Course Syllabus

Module 1: Python Programming Fundamentals and Flow Control

This module establishes the foundational technical language and structure required for all subsequent data analysis.

You will learn:

- Basic Data Types, Variables, and String manipulation
- Core Python Data Structures: Lists, Dictionaries, Tuples, and Sets
- Control Flow Mastery: Using if/else statements and loops for decision-making and iteration
- Defining and writing clean, reusable Functions

Tools:

Python | Google Colab

Module 2: The Data Handling Toolkit: NumPy and Pandas

Students learn to efficiently manage, clean, and restructure large, complex datasets using the two most critical Python libraries.

You will learn:

- NumPy Arrays: Understanding vectorization and numerical operations for speed
- The Pandas DataFrame: Importing data, initial data inspection, and selection
- Data Cleaning: Techniques for identifying and treating missing values and data format conversion
- Advanced Manipulation: Filtering, sorting, grouping data using .groupby(), and combining DataFrames (merging/joining)

Tools:

NumPy | Pandas

Module 3: Statistical Thinking, Data Preparation and ML Workflow

This module covers the statistical principles and critical preprocessing steps for preparing data for predictive modeling.

You will learn:

- Descriptive Statistics: Calculating and interpreting key metrics (Mean, Median, Variance, Std Dev)
- Data Visualization: Creating professional and informative charts using Matplotlib and Seaborn
- Feature Scaling and Engineering: Normalization, Standardization, and creating new predictive variables
- The Machine Learning Pipeline: Defining the sequential steps for building a reliable model
- Data Splitting: Implementing the vital Train-Test-Validation split

Tools:

Seaborn | Scikit-learn

Module 4: Core Supervised Learning: Regression and Classification

This module covers the foundational predictive models and the necessary metrics for evaluating their performance.

You will learn:

- Regression Models: Implementing Simple and Multiple Linear Regression
- Regression Metrics: Evaluating using Mean Squared Error (MSE) and R-squared
- Classification Models: Using Logistic Regression and Decision Trees to predict categories
- Classification Metrics: Utilizing the Confusion Matrix to calculate Accuracy, Precision, Recall, and F1-Score

Tools:

Scikit-learn (implied by model and metric implementation)

Module 5: Advanced ML concepts and Unsupervised Learning

This module is dedicated to building highly robust, production-ready models by mastering optimization techniques.

You will learn:

- Bias-Variance Trade-off: Understanding and addressing Overfitting and Underfitting
- Cross-Validation: Advanced validation techniques to ensure model reliability
- Ensemble Methods: Implementation of Random Forests and the intuition behind Gradient Boosting
- Hyperparameter Tuning: Techniques like Grid Search and Randomized Search to optimize model settings for peak performance
- Unsupervised Learning - Intro to K-means clustering for segmentation tasks

Tools:

Scikit-learn

Module 6: Advanced Generative AI Concepts and Tools

This new module provides a high-level, practical overview of industry-leading Generative AI concepts and architectural patterns

You will learn:

- Generative Model Landscape: Overview of LLMs, LVMs, and foundation models (GPT, Gemini, Llama)
- Prompt Engineering Strategies: Advanced prompting techniques (Chain-of-Thought, Few-shot prompting)
- Retrieval-Augmented Generation (RAG): Understanding the RAG architecture and its role in grounded, accurate GenAI applications
- Agentic AI: Introduction to AI Agents, planning, tool usage, and frameworks (e.g., LangChain/CrewAI concepts)
- Vector Databases and Embeddings: High-level concept of how vector stores enable semantic search

Tools:

GPT, Gemini, Llama (example LLMs) | LangChain/CrewAI (concepts)

Module 7: Capstone Project and Final Presentation

The program culminates in a comprehensive, application-focused project that integrates all analytical and technical skills learned.

You will learn:

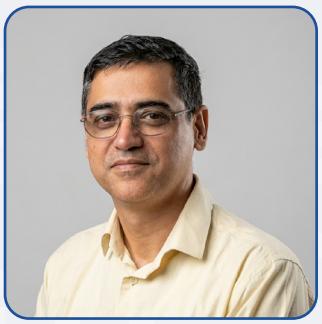
- Project scope finalization, data sourcing, and preparation
- Model selection, execution, and rigorous evaluation
- End-to-End Delivery: Building a complete predictive model, from choosing a public dataset to selecting the appropriate machine learning model and evaluating its performance, while documenting the entire process
- Final Presentation: Delivering a professional presentation that explains the technical solution, model performance, and potential business value

Tools:

All previous tools (Python, NumPy, Pandas, Scikit-learn, etc) | Presentation Software (Implied)

Due to the evolving nature of the industry expectations and partner institute feedback, some syllabus aspects may change. Any updates will be communicated during the Inauguration Session(s) or at the start of the relevant module

Under The Guidance Of



Prof. Sanjeev Manhas

Principal Investigator of E&ICT Academy, IIT Roorkee

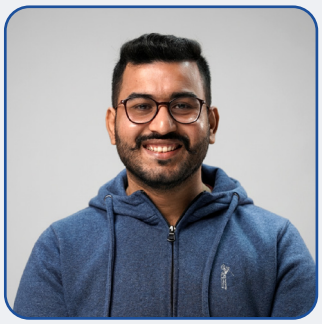
A distinguished academician, researcher, and innovator with extensive experience in academia, research, and industry. He holds a Ph.D. in Electronics and Computer Engineering from De Montfort University, UK, and an M.Tech. from IIT Madras. He has worked at Micron Semiconductor and the Institute of Microelectronics, Singapore, contributing to advanced DRAM and CMOS process integration. His research spans nanoscale devices, device-circuit co-design, novel memories, MEMS, sensors, and CMOS process technologies.

Our Instructors and Industry Experts

Prof. Raksha Sharma

Associate Professor, IIT Roorkee

Prof. Raksha Sharma is an Associate Professor in the Department of Computer Science and Engineering at IIT Roorkee, with research expertise in Natural Language Processing (NLP) and applied machine learning. Her work spans sentiment and sarcasm analysis, biomedical information extraction, and language–vision problems such as text generation and multimodal learning. She completed her PhD in Natural Language Processing from IIT Bombay (2017) and has prior industry research experience, including work as a Research Scientist at Tata Research Design and Development Center. Prof. Sharma has published in leading NLP venues and actively contributes to the research community through reviewing and program committee roles. She also teaches core CSE courses such as Machine Learning, NLP, Artificial Intelligence, and Theory of Computation, and supervises research projects across NLP and ML.



Sumit Shukla

Director of AI, Scaletrix.AI

Sumit (Analytics Guru Ji) Shukla is a Director of AI at Scaletrix.AI and a mentor/instructor in AI, ML, and GenAI. With 5+ years in e-learning and training across platforms like upGrad, Great Learning, and Simplilearn, he has delivered 20,000+ hours of instruction and built a reputation for simplifying complex concepts. He currently teaches global cohorts on LLMs, LangChain/LangGraph, RAG, and AI agents as a GenAI educator at Outskill, and also contributes as a faculty/coach with Masters' Union and other institutions. Academically, he holds an M.Sc. from Indian Institute of Technology Kanpur and focuses on industry-aligned, hands-on learning.

Ritesh Shantilal Firodiya

Technical Consultant, Walmart

Ritesh Firodiya is an experienced Full-Stack Architect and Developer with 8+ years of software development experience, specializing in TypeScript and modern web stacks. He currently works as a Technical Consultant at Walmart, building internal revenue and location management systems using React, React Native, and Node.js. Previously, he has delivered scalable products across Swiggy, Masai, and Globant, along with multiple consulting engagements. His strengths include system design, building production-ready applications, mentoring teams, and delivering robust full-stack solutions across web and mobile.

Admission Process

Clear Qualifier Test
You must pass the exam to confirm your seat for the program.

Complete Counselling
Only shortlisted candidates go through the counselling process.

Start Learning
Learn from India's top educators and stand out from the crowd.

Fees Structure

Qualifier Test Fee (Non-Refundable)	**₹99**

	Option 1	Option 2
	Upfront	**EMI** (Through Masai's NBFC Partners)
Secure Seat Fee (Non-Refundable)	₹4,000	₹4,000
Programme Fee (Non-Refundable)	₹51,000	₹6,516 x 9 months
Total	₹55,000*	₹62,644*

**GST at 18% extra, as applicable*

WhatsApp: +91 81972 92840
Email: eictiitrprograms@masaischool.com