DATA SCIENCE AND ARTIFICIAL INTELLIGENCE 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:** Receive a Certificate of Completion from E&ICT Academy, IIT Roorkee, recognising your achievement.

- **Campus Immersion:** An optional 3-day Campus Immersion for direct interaction with industry experts and peers.

- **Future-Proof Career Gateway:** Step into the rapidly evolving AI landscape by mastering Data Science and AI with hands-on expertise guided by top IIT faculty.

- **Advanced Curriculum:** Access cutting-edge business analysis content, engaging simulations, and practical evaluations. Focus on real-time project implementation for hands-on mastery.

- **Practical-Based Learning:** Work on hands-on projects and real-world AI scenarios, applying NLP and multi-agent frameworks to solve complex, industry-relevant problems.

- **World-Class Faculty:** Learn directly from top-tier faculty and industry experts.

- **Placement Opportunities:** Receive resume reviews, career coaching, and placement support to land your dream role.

Eligibility: 7+ CGPA and 65% attendance

What Will You Learn?

Drive your career forward by mastering Data Science and Machine Learning fundamentals. Learn to extract deep insights from complex data, build accurate predictive models, and become a portfolio-ready professional equipped to drive data-driven decision-making in any industry.

Toolkit

python™ matplotlib pandas NumPy

Course Details

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

Course Curriculum

Module 1: Programming & Data Foundations

- Python Fundamentals: Build comfort with variables, data types, conditionals, loops, functions, and core data structures to write programs that manipulate real data
- Notebook Workflow: Use Jupyter/Colab to run experiments, document analysis, and package work as shareable deliverables
- Working with CSV & JSON: Read/write structured data, validate schemas, and fix common issues like missing values, wrong types, and inconsistent formats
- API Fundamentals: Use Python to fetch real-world data via REST APIs, handle status codes, authentication keys, pagination, and convert responses into usable datasets

Module 2: Data Analysis with NumPy & Pandas

- NumPy Essentials: Use arrays and vectorized operations for fast computation and numeric manipulation
- Pandas Core Operations: Perform filtering, sorting, grouping, aggregation joins/merges, pivots, and date/time handling on datasets
- Data Cleaning & Preparation: Build repeatable workflows for missing values, duplicates, outliers, inconsistent categories, and messy text fields
- Exploratory Data Analysis (EDA): Ask structured questions, compute key metrics, and discover patterns that guide decisions or modeling

Module 3: SQL, Visualization & Data Storytelling

- SQL Fundamentals: Query relational data using joins, aggregations, subqueries, and filters to extract analysis-ready tables
- Applied SQL for Analytics: Use window functions for ranking, cohort-style analysis, and running totals
- Visualization for Decision-Making: Learn chart selection, avoid misleading visuals, and build clear plots that answer real questions
- Storytelling with Data: Convert analysis into a structured narrative with context, evidence, insights, and recommendations

Module 4: Maths & Statistics for Data Science (Applied)

- Math Foundations Used in DS: Learn transformations, scaling, logs/exponentials, vectors, and similarity intuition through practical examples
- Probability & Distributions: Build intuition for randomness and variability, and how distributions show up in real datasets
- Sampling & Estimation: Understand why samples mislead, how uncertainty arises, and how to reason about reliability of insights
- Hypothesis Testing & A/B Testing: Learn the logic behind experiments and how to avoid false conclusions
- Correlation vs Causation: Learn how misleading relationships happen and how to communicate limitations responsibly

Module 5: Machine Learning

- ML Workflow & Problem Framing: Convert questions into ML problems, define success metrics, and set up training/validation/testing correctly
- Regression Models: Build and evaluate regression systems, interpret errors, and improve results with better features and preprocessing
- Classification Models: Build classification systems and evaluate with precision/recall/F1, confusion matrices, and threshold tuning
- Tree-Based Models: Train decision trees and understand ensemble intuition (random forests/gradient boosting) for stronger real-world performance
- Feature Engineering & Pipelines: Create robust preprocessing + modeling pipelines that are reusable and less error-prone
- Model Improvement & Debugging: Detect leakage, handle imbalance, perform basic tuning, and run error analysis to systematically improve

Module 6: GenAI for Data Science

- Prompt Engineering for Applications: Design prompts that follow instructions reliably, produce structured outputs, and handle edge cases with consistency
- LLM APIs with Python: Integrate LLMs into Python workflows, manage failures gracefully, and design clean input-output contracts
- Embeddings & Vector Search: Convert text into embeddings, build semantic search, and retrieve relevant context from large document sets
- RAG (Retrieval-Augmented Generation): Build grounded Q&A systems by combining retrieval with generation, and reduce hallucinations through chunking and retrieval strategy
- Unstructured Data to Insights: Extract themes, summaries, and actionable insights from documents like PDFs, policies, support tickets, and internal knowledge bases

Capstone Project

- Build & Evaluate: Deliver a working solution with measurable outcomes and documented trade-offs

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

Prof. Sanjeev Manhas, Principal Investigator of E&ICT Academy, IIT Roorkee, is 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 & Industry Experts

Prof. Tharun Kumar Reddy Bollu
Assistant Professor, IIT Roorkee

Prof. Tharun Kumar Reddy Bollu is an Assistant Professor in the Department of Electronics & Communication Engineering at the Indian Institute of Technology Roorkee. He earned his B.Tech, M.Tech and Ph.D. degrees in Electrical Engineering from IIT Kanpur. Before joining IIT Roorkee, he served as Assistant Professor at IIT Dhanbad and as an AI Architect & Research Scientist in the USA. His research focuses on machine learning, brain–computer interfaces, EEG signal processing and AI for healthcare. He has led award-winning teams in international BCI competitions, published extensively in top IEEE journals, and serves as reviewer and editor for premier journals in computational intelligence and neuroscience.

Prof. Pawan Goyal
Professor, IIT Kharagpur

Prof. Pawan Goyal is a Professor in the Department of Computer Science and Engineering at the Indian Institute of Technology Kharagpur. He holds a Ph.D. in Computer Science from IIT Kanpur and has over a decade of academic and research experience. His primary research interests include natural language processing, machine learning, social network analysis, and AI systems. He has published extensively in top-tier international journals and conferences and has received multiple prestigious research grants and academic recognitions for his contributions to AI and NLP.

Prof. Indu Joshi

Assistant Professor, IIT Mandi

Dr. Indu Joshi received a Ph.D. from IIT Delhi. She was a postdoctoral researcher at Inria Sophia Antipolis, France, and the Technical University of Munich, Germany. She is an INAE student member and a Raman Charpak Fellow. She has represented India at the BRICS Young Scientist Conclave and has attended the Heidelberg Laureate Forum. She has also been awarded for her popular science writing skills by the Science and Technology Minister of India. She is a DAAD PostDocNet AI Fellow and a recipient of the Institute Silver Medal, awarded by the President of India, for her M.Tech degree.

Gaurav Kandel

Data Scientist, FinBox

Gaurav Kandel is a Data Scientist at FinBox with extensive experience across NIRA, KPMG India, and multiple AI mentorship roles. He frequently shares insights on practical machine learning topics, from deploying models in production to building scalable recommender systems and mastering prompt engineering in Vertex AI. Gaurav blends hands-on technical expertise with a passion for demystifying AI for learners, professionals, and businesses through teaching, writing, and real-world problem solving.

Shubhendu Shishir

Head of Engineering, Simplismart

Shubhendu Shishir is the Head of Engineering at Simplismart, where he is building a GenAI platform powering one of the fastest inference engines. With over 8 years of industry experience, he has previously worked at Amazon, Uber, Arcesium, and UnitedHealth Group, delivering large-scale, high-impact systems. Alongside his industry career, he brings 3+ years of teaching experience, mentoring learners in software engineering, system design, and applied AI.

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)	₹46,000	₹5,878 x 9 months
Total	₹50,000*	₹56,902*

*GST at 18% extra, as applicable

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