

MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY



25/05/2026

to

25/07/2026

Advanced Machine Intelligence and Data Analytics



Organized by:
Robotics & Machine Analytics (RAMAN) Lab
Department of Electrical Engineering
Malaviya National Institute of Technology Jaipur 302017, Rajasthan, India
www.mnit.ac.in, www.ramanlab.co.in

About MNIT

Malaviya National Institute of Technology (MNIT) Jaipur is one of the NITs established by Ministry of Human Resource Development, Government of India. The Institute, earlier known as MREC, was established in 1963 as a joint venture of the state and central Governments. Later in 2002, the college was given the status of National Institute of Technology and on August 15, 2007, proclaimed Institute of National Importance through Act of Parliament. MNIT campus spreads over 325 acres of lush green area in the prime location of Jaipur city. At present, in addition to research, consultancy and developmental activities, the Institute offers UG and PG (M. Tech./M.Sc. & Ph.D.) level courses to about 5000 students in almost all leading fields of engineering, technology, management and sciences.



About Department of EE

The Electrical Engineering Department is one of the oldest departments of the institute which was established in the year 1963. At present, the department offers undergraduate courses in Electrical Engineering along with postgraduate courses in Power Engineering, Power Electronics and drives, and Power Systems Management. The department has undertaken several research projects/schemes with financial assistance from AICTE, DST, and MHRD, including international collaborative research projects.

About Department of AIDE

The Department of Artificial Intelligence and Data Engineering (AIDE) at Malaviya National Institute of Technology (MNIT) was established recently in the year 2023. The department, with the joint faculty of different disciplines, promotes academic and research in AI, Data engineering and related technology to equip students with the knowledge and skills to thrive in this rapidly evolving landscape. The Department presently offers an academic program at the Undergraduate level - B.Tech. in AIDE with an intake of forty students. The department will soon offer Postgraduate, Doctoral, and other cutting-edge programs that combine AI principles with data engineering practices, preparing graduates to address real-world challenges.

About Summer School

The summer school is designed for understanding and implementing advanced and trending Artificial Intelligence (AI) and Machine Learning (ML) techniques in different fields. The applications of these techniques are quite broad including areas of engineering, business, and medicine. With the growing applications of AI/ML, engineering UG/PG students and faculties need to gain hands-on experience in implementing AI/ML techniques on different projects. This course will include lectures and hands-on lab sessions for the participants to learn in-depth theoretical concepts of different AI and ML techniques and their programming implementation in Python. Moreover, the participants will gain a **RAMAN membership** with a validity of 1 year. Which will allow participants to access resources and collaborate with RAMAN on a research area.

Patron

Prof. N. P. Padhy
Director, MNIT Jaipur

Convener

Prof. Nikhil Gupta
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Important Dates

Last date of registration	23 rd May, 2026
Confirmation of selection	24 th May, 2026
Summer School start date	25 th May, 2026

Course Contents

Linear Models for ML: Regression Vs Classification, Linear Regression, Regularization Techniques (Ridge, Lasso, Elastic-Net, Logistic Regression, Bias-Variance Trade-off, Gradient Descent Variants (Batch, Stochastic, Mini-batch), Performance Metrics

Tree-Based Machine Learning Algorithms: Decision Tree Algorithms, Ensemble Methods, Random Forest, Gradient Boosting, XGBoost.

Support Vector Machines: Hard-Margin SVM, Soft-Margin SVM, Kernel Methods.

Unsupervised Clustering: DBSCAN, k-Means Algorithm, Hierarchical Clustering.

Dimensionality Reduction: Singular Value Decomposition, Principal Component Analysis (PCA), Nonlinear Methods: t-SNE, UMAP.

Deep Learning Foundations: Neural Networks (NN) Introduction to Artificial Neural Networks and Learning Paradigms, Activation Functions and Loss Functions, Back-propagation, Robust Regularization Techniques, Multilayer Perceptron, Deep Neural Network.

Convolutional Neural Networks (CNN): Fundamentals of CNN, Key Components of CNN, Landmark architectures (LeNet, AlexNet, VGG16, VGG19, ResNet, InceptionNet).

Recurrent Neural Networks (RNN) & LSTM: RNN for sequential data, Vanishing Gradient Problems in RNN, Long Short Term Memory (LSTM), Gates in LSTM, Gated—Recurrent Networks (GRU), Continuous—Time Recurrent Neural Networks (CTRNN) for Dynamic Systems, Liquid Time Constant Neural Networks (LTCNN).

Transformers & Large Language Models (LLMs): Attention Mechanism and the Transformer Architecture, Encoder—Decoder Framework and Self Attention, Large Language Models.

Reinforcement Learning & Intelligent Agents: Fundamentals of Reinforcement Learning, Markov Decision Process, Dynamic Programming, TD Learning, Q—Learning, SARSA, Deep—Q Learning, Policy Gradient, Actor—Critic Architecture, Deep Deterministic Policy Gradient (DDPG), Trust Region Policy Optimization (TRPO), Proximal Policy Optimization (PPO).

Generative Adversarial Networks (GANs): Concept of Generator and Discriminator Networks, Overview on Type of GANs.

Visual Language Action Models for Robotics: Fundamentals of VLAM, Multimodal Transformers, CLIP-style Cross-Modal Alignment, Vision-Language Pretraining, Instruction-Following AI Agents, Multimodal Reasoning, Language Conditioned-Policy Learning, Multimodal Reinforcement Learning.

Brain Inspired AI & Neuromorphic Computing: Spiking Neural Networks (SNNs), Encoding Schemes, Neural Computation, Back—Propagation through time, Surrogate Time-Dependent Plasticity (STDP)

Learning from Humans and Animals: Cognitive and Behavioral Inspiration for AI, Future AI Directions

Hands on Session: Application and Hands on Experience on NN, CNN, RNN, LSTM, GANs, RL and SNNs.

About RAMAN Lab

RAMAN Lab was established in September 2014 by Prof. Rajesh Kumar in the Department of Electrical Engineering at Malaviya National Institute of Technology (MNIT) Jaipur, Jaipur, Rajasthan, India. The lab focuses on applying Computational Intelligent techniques, in various interdisciplinary research areas, including control of Robotics and Automation, Biomedical Signal and Image Processing, Bioinformatics, Healthcare, Energy Management, and Electric Vehicles.

Registration Fees

UG Students	Rs. 20,000/-
PG students/PhD	Rs. 22,000/-
Faculty	Rs. 25,000/-
Industrial Employee	Rs. 25,000/-

Note: 18% GST is included in the registration fees.

Payment Mode

NEFT/IMPS:

Name: Registrar (Sponsored Research) MNIT

Account No.: 676801700388

IFSC CODE: ICIC0006768 (ICICI BANK, MNIT)

Registration Form Details

After fee submission, the applicant must register themselves by submitting details on [Google Form Link](#)

Further details of the internship and instructions for filling the form may be found on [Raman Lab Website](#).

All registration forms must be received by 23rd May, 2024. Registration fee is non-refundable.

General Information

Accommodation and travelling expenses are to be borne by the participants. Limited accommodation on actual charges may be available at MNIT Hostels. A request for hostel accommodation will need to be made in advance. The participant will not be paid any TA/DA.

Address for Correspondence

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Scan for Online Registration Form