सीएसआईआर - राष्ट्रीय अंतर्विषयी विज्ञान तथा प्रौद्योगिकी संस्थान
CSIR - NATIONAL INSTITUTE FOR INTERDISCIPLINARY SCIENCE AND TECHNOLOGY (NIIST)
Industrial Estate, Pappanamcode, Thiruvananthapuram

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Three-Day Hands-On Workshop for Undergraduate Students

FOUNDATIONS OF DEEP LEARNING FOR PREDICTIVE ANALYTICS

6 - 8 March 2026
CSIR-NIIST Thiruvananthapuram

Who Can Attend

- Undergraduate students (2nd–4th year) from Engineering, Science, Mathematics, and Computer Applications
- Students aspiring for careers in AI, ML, Data Science, and Computational Research
- Basic familiarity with computer programming is recommended

Tools & Technologies

Python, NumPy, Pandas, Matplotlib, Seaborn, Scikit-learn, PyTorch, Torchvision, Optuna, OpenCV, Xarray, Time-Series & Image Datasets

Pedagogy

- 40% Conceptual Lectures (mathematical intuition & model theory)
- 60% Guided Hands-On Coding Sessions
- Live demonstrations, code walkthroughs, and project mentoring

Registration fees

- Students : ₹3000
- Researchers : ₹5000

Apply Online :
http://sdp.niist.res.in

Contact

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About the Workshop

This intensive three-day hands-on workshop is designed to provide participants with a strong theoretical and practical understanding of modern predictive modelling. The course begins with essential mathematical concepts including linear algebra and probability, covering matrix operations, vector spaces, basis and dimension, and fundamental probability principles such as conditional probability and independent events.

Building on this foundation, the workshop introduces time series modelling using classical machine learning approaches such as Support Vector Regression (SVR), followed by deep learning sequence models including LSTM and Bi-LSTM to capture long-term dependencies in real-world data. The course also explores predictive image analysis using Convolutional Neural Networks (CNNs), hyperparameter tuning strategies, and an introduction to diffusion models for advanced generative and predictive tasks.

By the end of the workshop, participants will gain conceptual clarity and hands-on exposure to mathematical tools and deep learning architectures widely used in predictive analytics across science, engineering, and industry.

Key Learning Outcomes

» Linear Algebra & Probability for Machine Learning
» Predictive Modeling with Classical ML & Deep Learning
» Time-Series Forecasting using LSTM & Bi-LSTM
» CNN-Based Models for Image Prediction
» Introduction to Diffusion-Based Generative Models

Workshop Structure

Day 1:
Mathematical Foundations & Classical Machine Learning Linear Algebra for ML, Probability Concepts, Regression, Support Vector Regression (SVR)

Day 2:
Time-Series Modelling & Deep Learning Time-Series Preprocessing, RNN, LSTM, Bi-LSTM Models, Forecasting Applications

Day 3:
Image Analytics & Advanced Models Convolutional Neural Networks (CNNs), Transfer Learning, Introduction to Diffusion Models, Keystone Project Demonstration

Hands-on Projects

Participants will complete guided capstone project (team-based or individual) integrating mathematics, modelling, and implementation:

✓ Time-Series Forecasting: Weather/energy demand/ financial trend prediction using LSTM/Bi-LSTM

✓ Predictive Image Analytics: Satellite or medical image classification using CNNs and transfer learning

✓ Hybrid ML–DL Model: SVR vs deep learning comparison for real-world regression problems

✓ Introductory Generative Modelling: Diffusion-based image synthesis and prediction demo