



# **30-Hours Value Added Course on Applied Machine Learning and Deep Learning with Python**

**(CAV-25-01)**  
**(Instructor-led Offline/Online Classes)**  
**Session 2025-26**

**For**  
**BCA / MCA Students**

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**Organized By**  
**Department of Computer Application in Association with Integral  
University Center for Advanced Training, Lucknow**

# Content

## **Introduction to Machine Learning and Deep Learning**

- History and evolution of AI/ML/DL
- Supervised, Unsupervised, Reinforcement learning overview
- Role of Python in ML/DL
- Setting up environment: Anaconda, Jupyter, Google Colab
- Installing required packages: scikit-learn, TensorFlow, Keras

## **Python Libraries for Machine Learning**

- Numpy and Pandas for data handling
- Matplotlib and Seaborn for data visualization
- Introduction to Scikit-learn workflows
- Overview of TensorFlow and Keras structure

## **Supervised Learning Models**

- Linear and Logistic Regression
- Decision Trees and Random Forests
- Support Vector Machines (SVM)
- Model training, testing and validation
- Performance evaluation metrics: Accuracy, Precision, Recall, F1-score

## **Unsupervised Learning Models**

- K-Means and Hierarchical Clustering
- Principal Component Analysis (PCA)
- Anomaly detection basics

## **Introduction to Deep Learning**

- What is a Neural Network?
- Structure of an artificial neuron
- Forward and backward propagation
- Activation functions: ReLU, Sigmoid, Tanh

## **Deep Learning with Keras/TensorFlow**

- Building Deep Neural Networks (DNNs)
- Compiling, training, and evaluating models
- Overfitting and underfitting, regularization techniques
- Introduction to Callbacks and EarlyStopping

## **Convolutional Neural Networks (CNNs)**

- Sequence modeling concepts
- RNN basics and LSTM introduction
- Text preprocessing and tokenization
- Sentiment analysis with LSTM

## **Capstone Project & Real-World Applications**

- Selecting and preparing datasets (Kaggle, UCI)
- Implementing an end-to-end ML/DL project
- Documenting code and presenting results
- Ethical considerations in AI applications