

CO3	classification, object detection, natural language processing, and time-series prediction.
CO4	Explore and implement advanced deep learning techniques such as transfer learning, generative adversarial networks (GANs), attention mechanisms, and transformers to address cutting-edge research and industry challenges.

S. NO	Contents	Contact Hours
UNIT 1	Overview of Artificial Intelligence, Machine Learning, and Deep Learning, History and evolution of deep learning, Applications of deep learning, Perceptron and multi-layer perceptron, Activation functions, Loss functions and their significance, Gradient Descent and Backpropagation, Neural Networks: Deep vs Shallow Networks, Training Deep Networks: Vanishing and Exploding Gradients, Techniques to mitigate gradient issues (Batch Normalization, Gradient Clipping), Optimization algorithms (SGD, Adam, RMSprop), Regularization techniques (L2, Dropout), and Weight Initialization	16

UNIT 2	Convolutional Neural Networks, and their significance in image processing, Convolution operations and feature maps. Pooling layers, CNN architectures: LeNet, AlexNet, VGG, ResNet, Inception, Transfer learning and fine-tuning pre-trained models, Object detection and segmentation (YOLO, SSD, Mask R-CNN), Introduction to Generative Adversarial Networks, Autoencoder. Variational Autoencoders.	14
UNIT 3	Recurrent Neural Networks (RNNs), Long Short-Term Memory (LSTM) networks, Gated Recurrent Unit (GRU), Attention Mechanisms and Transformers, Sequence-to-sequence models with attention, and applications in natural language processing.	12
	TOTAL	42