

Nirma University
School of Technology, Institute of Technology
B. Tech (Instrumentation and Control Engineering)

Semester VII

L	T	P	C
2	0	2	3

Course Code	2ICDE61
Course Title	Deep learning for vision systems

Course Outcomes (CO):

At the end of the course, students will be able to -

1. illustrate basic architecture of convolution neural networks
2. evaluate existing practical vision systems
3. optimize convolutional neural network model
4. design deep learning based real life vision applications

Syllabus:

**Teaching
Hours**

UNIT 1: Introduction to computer vision

04

Image acquisition, image pre-processing, feature extraction, computer vision pipeline, applications of computer vision

UNIT 2: Deep learning

05

Single layer perceptron, multi-layer perceptron (MLP), activation functions, errors functions, backpropagation, feedforward process, optimization algorithm

UNIT 3: Convolutional neural networks

05

Image classifications using MLP, basic components of a convolutional neural network (CNN), CNN architecture, image classification using CNN, overfitting and underfitting, popular CNN architectures

UNIT 4: Design of deep learning structure

09

Baseline model design, define performance metrics, data preparation, model training, model evaluation, performance estimation, network improvements, hyperparameter tuning, optimization and learning, regularization, batch normalization

UNIT 5: Image classifications

Object detection, transfer learning, object classification, advanced CNN

Self-Study:

The self-study contents will be declared at the commencement of semester. Around 10% of the questions will be asked from self-study contents.

Laboratory Work:

Laboratory work will consist of minimum 10 experiments based on the above syllabus.

References:

1. Mohamed elgendy, Deep learning for vision systems, Manning publications
2. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep learning, The MIT press publications
3. Francois chollet, Deep learning with python, Manning publications
4. Josh patterson, Adam gibson, Deep learning: A practitioner's approach, Shroff/O'Reilly publications
5. Nikhil buduma, Nicholas locascio, Fundamentals of deep learning: Designing next-generation machine intelligence algorithms, Shroff/O'Reilly publications

L= Lecture, T= Tutorial, P= Practical, C = Credit