

**Nirma University**  
**Institute of Technology, School of Technology**  
**MTech Computer Science & Engineering / M Tech Computer Science and**  
**Engineering (Data Science)**  
**Semester – II**

L	T	P	C
3	0	2	4

<b>Course Code</b>	3CS12D302
<b>Course Name</b>	Deep Learning and Applications

**Course Learning Outcomes (CLOs):**

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

1. comprehend the strengths and weaknesses of deep networks
2. analyze suitability of different deep networks for variety of problems
3. design and implement deep networks for solving problems pertaining to computer science and interdisciplinary research

**Syllabus:**

**Teaching  
Hours**

**Unit I**

**Applications of Convolutional Neural Networks:** Understanding CNN, Image Classification with Localization, Object Detection, Semantic Segmentation, Instance Segmentation

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**Unit II**

**Applications of Recurrent and Recursive Neural Networks:** Understanding Recurrent and Recursive Neural Networks, Word Embedding, Language Models, Named-Entity Recognition, Machine Translation, Parsing, Sentiment Analysis, Speech Recognition

**13**

**Unit III**

**Specific Applications:** Image Captioning, Video Captioning, Document Classification, Prediction in Stock Markets, Recommender Systems, Dimensionality Reduction, Image Denoising, Anomaly Detection from Video, Face and Facial Expression Recognition

**13**

**Unit IV**

**Generative Applications:** Understanding Generative Adversarial Networks, Image Inpainting, Image Super Resolution, Colorization of Black and White Images, Human Face Generation, Text2Image, Music Generation

**9**

**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 be based on above syllabus with minimum 5 experiments to be incorporated.

## **Suggested Readings<sup>^</sup>:**

1. Ian Goodfellow, Yoshua Bengio, Aaron Courville, Deep Learning, MIT Press
2. Adam Gibson, Josh Patterson, Deep Learning, O'Reilly Media, Inc.
3. Francois Chollet, Deep Learning with Python, Manning Publications

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

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<sup>^</sup>this is not an exhaustive list