

1.	Title of the course	Deep Learning: Theory and Applications
2.	Course number	EE601L
3.	Structure of credits	3-0-0-3
4.	Offered to	PG
5.	New course/modification to	Modification To EE6021/7
6.	To be offered by	Department of Mathematics and Statistics
7.	To take effect from	July 2022
8.	Prerequisite	CoT
9.	<b>Course Objective(s):</b> To understand the concepts, theory and computational algorithms needed for several advanced real world recognition and understanding of tasks such as text, speech, characters, objects etc. To simulate and understand how machine will have power to accomplish these tasks and can aim at developing several exciting examples based learning tasks in several domains ranging from medical, economical, engineering to state of the art industrial needs.	
10.	<b>Course Content:</b> Introduction to real signals: text, speech, image, and video; Signal processing for feature extraction: Text (BoW), Speech (LPC), Images (Harries, HoG), Videos (BoVW); Neural Networks (NNs): Computational Graph (CG) formulation, matrix vector formulation for back propagation in Deep NNs; Deep learning methods: Convolutional NNs, Training in CNNs; Evolution of CCN architectures; Theory of Recurrent NNs: Back Propagation Through Time (BPTT); Long Short Term Memory(LSTM) RNNs; Applications of Deep Nets: Single and multi-object detection, Image segmentation, 3D reconstruction, Tracking, Word prediction, Image captioning, Attention Networks, Auto encoders and GANs (Generative adversarial networks); Applications in image generation; Understanding of Deep NNs.	
11.	<b>Textbook(s):</b> 1. Goodfellow I, Bengio Y, and Courville A, <i>Deep Learning</i> , MIT Press (2016). 2. Li D, and Yu D, <i>Deep Learning: Methods and Applications</i> , NOW Publishers, (2014).	
12.	<b>Reference(s):</b> 1. Szeliski R, <i>Computer Vision: Algorithms and Applications</i> , Springer (2011).	