

**INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI**  
**PROFORMA FOR NEW COURSE**

1.	Title of the Course	Deep Learning: Theory and Applications
2.	Course Number	EE6021
3.	Status of the Course	Elective
4.	Structure of Credits	3-0-0-3
5.	Offered To	PG
6.	New Course/Modification to	New
7.	To be Offered by	Department of Electrical Engineering
8.	To take effect from	July 2019
9.	Prerequisite	CoT
10.	Whether approved by the Department	Yes
11.	<b>Course Objective:</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.	
12.	<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.	
13.	Text book(s): 1. I. Goodfellow, Y. Bengio, and A. Courville, <i>Deep Learning</i> , MIT Press, (2016). 2. D. Li, and D. Yu, <i>Deep Learning: Methods and Applications</i> , NOW Publishers, (2014).	
14.	Reference(s): 1. R. Szeliski, <i>Computer Vision: Algorithms and Applications</i> , Springer, (2011).	