भारतीय प्रौद्योगिकी संस्थान तिरुपति
TIRUPATI

INDIAN INSTITUTE OF TECHNOLOGY TIRUPATI
भारतीय प्रौद्योगिकी संस्थान तिरुपति
Yerpedu-Venkatagiri Road, Yerpedu Post, Tirupati District, Andhra Pradesh - 517 619

1.	Title of the course	Machine Learning for Signal Inference
2.	Course number	EE567L
3.	Structure of credits (L-T-P-C)	3-0-0-3
4.	New course/modification to	New
5.	To be offered by	Electrical Engineering
6.	Proposed by	Gorti R K S S Manyam
7.	Prerequisite	CoT
8.	**Course Objective(s):** To introduce signal processing techniques to understand complex real-world signals like speech and images for effective feature extraction and representation. To discuss machine learning approaches for the classification/interpretation of real-world signals.	
9.	**Course Content:** Introduction to real-world signals: text, speech, image and video; Signal processing for feature extraction of (i) speech/audio: Short Time Fourier Transform (STFT), Mel-frequency Cepstral Coefficients (MFCC) and Linear Prediction Coding (LPC) (ii) images: histogram, convolution, edges, histogram of orientation gradients; Bayesian classification and parameter estimation; Neural networks for classification, regression, prediction and parameter estimation; Introducing Convolutional Neural Networks (CNN) for image-based classification, regression and inference tasks; Gaussian Mixture Models (GMM) and Expectation-Maximization (EM) for clustering; Pattern recognition using machine learning for audio classification, speech denoising and speaker recognition; Image classification, denoising and segmentation; Other applications such as time series analysis or medical signal classification.	
10.	**Textbook(s):** 1. Deller J R, Hansen J H L and Proakis J G, Discrete-Time Processing of Speech Signals, IEEE Press (2000). 2. Duda R O, Hart P E and Stork D G, Pattern Classification, 2nd Edition, John Wiley and Sons Inc. (2007).	
11.	**Reference(s):** 1. Gonzalez R C and Woods R E, Digital Image Processing, 4th Edition, Pearson Education (2018). 2. Bishop C M, Pattern Recognition and Machine Learning, 2nd Edition, Springer (2013). 3. Goodfellow I, Bengio Y and Courville A, Deep Learning, MIT Press (2016).	