Course Name**: CS-419 Deep Learning**
Credit Hours: 2-1
Contact Hours: 2-3
Pre-requisites: Probability & Statistics and Fundamentals of Computer Programing

Course Introduction:

Deep Networks have revolutionized computer vision, speech recognition and language translation. They have growing impact in many areas of science and engineering. This course aims to cover the basics of Deep Learning and some of the underlying theory with a particular focus on supervised Deep Learning, with a good coverage of unsupervised methods. All lectures are supplemented by homework and lab implementations of deep learning tasks using Python and associated libraries.

CLO No	Course Learning Outcomes	Bloom Taxonomy
CLO-1	Understand deep learning design principles and best practices.	C2 (Understand)
CLO-2	Identify the deep learning algorithms which are more appropriate for various types of learning tasks in various domains.	C2 (Understand)
CLO-3	Apply deep learning algorithms to solve real-world problems.	C4 (Analyze)
CLO-4	Implement deep learning algorithms for solving problems	P4 (Articulation)

Course Outline:

Artificial Neural Network, Perceptron, loss minimization, Backpropagation, Gradient Descent, Implementation ANN using PyTorch, Convolutional Neural Network, Visual Recognition, Filtering, Conv and Pooling Layers, fully connected layer, Training Neural Networks, Sequence Modeling, LSTM, Natural Language Processing, word embedding (word2vec), Neural Machine Translation, Seq2seq and attention, Object Detection and Segmentation, Semantic Segmentation, Instance Segmentation, Generative Adversarial Networks, Autoencoder

Reference Materials:
1. Deep Learning by Ian Good Fellow, Y Bengio, G Hinton, 2016 MIT Press
2. Deep learning with Python by F Chollet, 2017