CS318: Deep Learning	L	T	P	Artificial Intelligence and Neural Networks
	3	0	2	

Course Objective: Become an expert in neural networks, and learn to implement them in Keras and Tensor flow

S. No.	Course Outcomes (CO)
CO1	Explain Deep Learning Foundations and Architecture
CO2	Design and Implement Deep Learning Models
CO3	Analyse and Optimize Model Performance
CO4	Implement and Evaluate Generative Models
CO5	Apply Ethical Principles in Deep Learning Practice

S. No	Contents	Contact Hours
UNIT 1	Machine Learning Basics: Learning Algorithms, Capacity, Overfitting and Underfitting, Hyperparameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood Estimation, Bayesian Statistics, Supervised Learning Algorithms, Unsupervised Learning Algorithms, Stochastic Gradient Descent	7
UNIT 2	Architecture of Neural Network, Hidden Units, Gradient-Based Learning, Back-Propagation	6

UNIT 3	Regularization for Deep Learning, Train / Dev / Test sets, Bias / Variance, Regularization, Dropout Regularization, Understanding Dropout, Other regularization methods, Normalizing inputs, Vanishing / Exploding gradients, Weight Initialization for Deep Networks	**6**
UNIT 4	Optimization for Training Deep Models, Mini-batch gradient descent, Exponentially weighted averages, Bias correction in exponentially weighted averages, Gradient descent with momentum, RMSprop, Adam optimization algorithm, Learning rate decay	**6**
UNIT 5	Convolutional Networks, Convolution operation, Motivation, Padding, Stride Convolutions, Convolutions Over Volume, One Layer of a Convolutional Network, Simple Convolutional Network, Pooling Layers CNN Example architectures	**8**
UNIT 6	Sequence Modeling: Why sequence models? Notation, Recurrent Neural, Network Model, Backpropagation through time, Different types of RNN, Vanishing gradients with RNNs, Gated Recurrent Unit (GRU), Long Short Term Memory (LSTM), Optimization for Long-Term Dependencies, Bidirectional RNN, Deep RNNs	**9**
	Total	**42**