CSDX 530	DEEP LEARNING TECHNIQUES	L	T	P	C
SDG: 8		3	0	0	3

COURSE OBJECTIVES:

COB1: To understand the theoretical foundations, algorithms and methodologies of Neural Network.

COB2: To provide the practical knowledge in handling and analyzing real world applications.

COB3: To learn the topics such as convolution neural networks, recurrent neural networks, training deep networks and high-level interfaces.

COB4: To familiarize with the fundamental concepts of artificial neural networks.

COB5: To study the complexity of deep learning algorithms and their limitations.

MODULE I   INTRODUCTION TO DEEP LEARNING   09

Learning algorithms- Maximum likelihood estimation- Building machine learning algorithm- Neural Networks Multilayer Perceptron- Back-propagation algorithm and its variants Stochastic gradient decent- Curse of Dimensionality.

MODULE II   DEEP LEARNING ARCHITECTURES   09

Machine Learning and Deep Learning- Representation Learning- Width and Depth of Neural Networks- Activation Functions: RELU- LRELU- ERELU- Unsupervised Training of Neural Networks -Restricted Boltzmann Machines- Auto Encoders- Deep Learning Applications.

MODULE III   DEEP LEARNING NETWORKS   09

Introduction – Historical context of Deep Learning – Classes of Deep Learning Network – Deep Networks for Unsupervised learning – Deep Networks for Supervised learning – Hybrid Deep Networks.

**MODULE IV   CNN ARCHITECTURE & SEQUENCE   09
                      MODELLING**

Architectural Overview-Motivation - Layers- Filters- Parameter sharing-Regularization, Popular CNN Architectures: ResNet- AlexNet – Applications. Recurrent Neural Networks- Bidirectional RNNs, Encoder-decoder sequence to sequence architectures - BPTT for training RNN-Long Short Term Memory Networks - Deep Belief networks- Boltzmann

Machines, Deep Boltzmann Machine, Generative Adversial Networks.

**MODULE V   PRACTICAL   METHODOLOGY   AND   09
                        APPLICATION**

Cross Validation, Feature Selection, Regularization - Baseline Models - Selecting Hyper parameters - Debugging Strategies - Example: Multi-Digit Number Recognition – Applications - Computer Vision, Speech Recognition and Natural Language Processing – Other Applications.

L – 45; TOTAL HOURS – 45

TEXT BOOK:
1. Michelucci, Umberto," Advanced   Applied   Deep   Learning: Convolutional Neural Networks and Object Detection", Apress, First Edition**,** ISBN: 9781484249765, 1484249763, 2019.

REFERENCES:
1. Gibson, A., Patterson, J. "Deep   Learning: A   Practitioner's Approach. Taiwan: O'Reilly   Media",   First Edition,ISBN:9781491914236, 1491914238, 2017.

2. YuxiLiu,Saransh Mehta," Hands on Deep learning Architectures with Python", Packt Publishing Ltd, First Edition, ISBN:9781788998086, 2019.

3. Bert Moons,Daniel Bankman,Marian Verhelst," Embedded Deep Learning",Springer,First Edition,ISBN:9783319992228,2019.

COURSE OUTCOMES:
Students who complete this course will be able to
CO1: Identify the characteristics of deep learning models that are useful to solve real-world problems.
CO2: Implement the different methodologies to create the applications using deep nets.
CO3: Analyze the concept of Deep Learning networks.
CO4: Design and deploy the CNN architectures.
CO5: Construct the complete speech reorganization system.

Board of Studies (BoS) :   **Academic Council:**
19th BOS of CSE held on 28.12.2021   18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2
CO1	M												H	
CO2					L									
CO3														M
CO4		M												M
CO5			M			L								H

Note: L- Low Correlation   M - Medium Correlation   H -High Correlation

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

Statement:

By learning "Deep Learning Algorithm And Architectures", the students are able to develop deep learning models and apply them to real world complex problems which in turn lead to economic growth and productive employment and decent work.