

Name of the Programme: M.Sc. in Artificial Intelligence

Course Code: CSI-509

Title of the Course: Deep Learning Lab

Number of Credits: 2(0L-0T-2P)

Effective from AY: 2023-24

<u>Prerequisites for the course</u>	Programming, Machine Learning Skills. Statistics,Calculus,Linear Algebra.Probability.	
<u>Objectives</u>	1. To make students comfortable with tools and techniques required in handling large amounts of datasets. 2. They will also uncover various deep learning methods in NLP, Neural Networks etc.	
<u>Content</u>	Tensorflow with Python Introducing Tensorflow - Tensorflow as an Interface - Tensorflow as an environment - Tensors - Computation Graph - Installing Tensorflow - Tensorflow training - Prepare Data - Tensor types - Loss and Optimization - Running tensorflow programs.	5 hours
	Building Neural Networks using Tensorflow Building Neural Networks using Tensorflow - Tensorflow data types - CPU vs GPU vs TPU - Tensorflow methods - Introduction to Neural Networks - Neural Network Architecture - Linear Regression example revisited - The Neuron - Neural Network Layers - The MNIST Dataset - Coding MNIST NN.	5 hours
	Deep Learning using Tensorflow Deepening the network - Images and Pixels - How humans recognise images - Convolutional Neural Networks - ConvNet Architecture - Overfitting and Regularization - Max Pooling and ReLU activations - Dropout - Strides and Zero Padding - Coding Deep ConvNets demo - Debugging Neural Networks - Visualising NN using Tensorflow - Tensorboard.	5 hours
	Transfer Learning using Keras and TFLearn Transfer Learning Introduction - Google Inception Model - Retraining Google Inception with our own data demo - Predicting new images - Transfer Learning Summary - Extending Tensorflow - Keras - TFLearn - Keras vs TFLearn Comparison.	5 hours
	Suggest ideas for lab work	
	Assignment -1 Cat vs. Dog Image Classifier	3 hours
	Assignment -2- Covid-19 Detection in Lungs	3 hours
	Assignment -3- Digit Recognition System	3 hours
	Assignment - 4- Facial Recognition Application	3 hours
	Assignment -5- Face Mask Detection	3 hours
	Assignment -6- Cyber-Attack Prediction	3 hours
	Assignment -7- Automated Attendance System	3 hours
	Assignment -8 Emotion Recognition	3 hours
	Assignment -9- Object Detection System	3 hours

	Assignment 10 - Recommender System	3 hours
<u>Pedagogy</u>	Lab assignment/mini project	
<u>References/ Readings</u>	1. Ian Goodfellow and Yoshua Bengio and Aaron Courville. Deep Learning. An MIT Press book. 2016. 2. Charu C. Aggarwal. Neural Networks and Deep Learning: A Textbook. Springer. 2019. 3. Grokking Artificial Intelligence Algorithms by Rishal Hurbans published by Manning Publications. 4. Deep Learning From Scratch: Building with Python from First Principles by Seth Weidman published by O`Reilley. 5. Deep learning in Python/ Pytorch by Manning Publications. 6. Deep Learning with Python by francois chollet. 7. Dive into Deep Learning by Ashton Zang. 8. Introduction to Deep Learning by Sandro Skansi.	
<u>Course Outcomes</u>	1. Practical application of deep learning techniques. 2. Implementation and training of deep learning models. 3. Data preprocessing and augmentation for deep learning. 4. Model evaluation and optimization.	