Name of the Programme: M.Sc. in Artificial Intelligence
Course code: CSI-505
Title of course: Mathematics Foundation for AI using Matlab
Number of credits: 2 (0L-0T-2P)
Effective from AY: 2023-24

Prerequisites for the course	Mathematical foundation theory and programming background	
Objectives	The lab assignment are aimed at demonstration of the following regarding statistics	
Content	Revision of the following : NumPy is a third-party library for numerical computing, optimized for working with single- and multi-dimensional arrays. Its primary type is the array type called ndarray. This library contains many routines for statistical analysis. SciPy is a third-party library for scientific computing based on NumPy. It offers additional functionality compared to NumPy, including scipy.stats for statistical analysis. Pandas is a third-party library for numerical computing based on NumPy. It excels in handling labeled one-dimensional (1D) data with Series objects and two-dimensional (2D) data with DataFrame objects. Matplotlib is a third-party library for data visualization. It works well in combination with NumPy, SciPy, and Pandas.	6 hours
	Assignment 1 - Write program to implement the following concepts using python libraries -Numpy,Pandas, matplotlib, seaborn,scipy, scrapy and beautiful soup, and tensor flow ,keras and pytorch etc	
	Assignment -2 - Sampling ,Variables in Statistics, Frequency Distributions. Generate frequency distribution tables,Generate grouped frequency distribution tables and -Visualizing Frequency Distributions -Generate bar plots, pie charts, and histograms ,Employ bar plots, pie charts and histograms.	6 hours
	Assignment-3-Comparing Frequency Distributions -grouped bar plots- step-type histogram-kernel density estimate plots- strip plots and box plots	6 hours
	Assignment-4 -Multidimensional image operations,Solving differential equations and the Fourier transform using scipy	6 hours
	Assignment-5 -Optimization algorithms using scipy.	6 hours
	Assignment -6 -Linear algebra using scipy	6 hours
	Assignment- 7-Program in python to implement the concepts such as Vector space, subspace, span, coumn space, row space, null space, left-null space, rank, basis, orthogonal matrix, symmetric matrix	6 hours
	Assignment -8 – Implement Eigen value decomposition in python.	6 hours
	Assignment-9 – implement SVD using python.	6 hours
	Assignment -10 – implement some of optimization algorithm using the python library	6 hours
Pedagogy	lab assignments /Project	
References/ Readings	1. Statistics Written, Robert S. Witte and John S. Witte 2. Barron's AP Statistics, 8th Edition, Martin Sternstein, PhD. 3. Statistics for Business and Economics 4. Naked Statistics: Stripping the Dread from the Data, Charles Wheelan 5. Introduction to Linear Algebra, Gilbert Strangsss	

Course Outcomes	1. Practical application of mathematical concepts in AI. 2. Proficiency in data manipulation, analysis, and visualization. 3. Implementation and experimentation with AI algorithms. 4. Development of critical thinking and problem-solving skills in AI.

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