Course Code	UDS21201J	Course Name	INTRODUCTION TO DATA SCIENCE	Course Category	C	Professional Core Course	L	T	P	C
							4	0	2	5

Pre-requisite Courses	Nil	Co-requisite Courses	Nil	Progressive Courses	Nil
Course Offering Department	Computer Applications		Data Book / Codes/Standards	Nil	

Course Learning Rationale (CLR):	The purpose of learning this course is to:
CLR-1 :	Understand the basics of Data Science
CLR-2 :	Learning and implementing the fundamentals of Python for data science
CLR-3 :	Exploring python libraries and data analysis methodologies like Exploratory Data Analysis
CLR-4 :	Learning basic and advanced concepts in Machine Learning and Deep Learning
CLR-5 :	Understanding Computer Vision and Data Visualization
CLR-6 :	Appreciate the applications and implications of Data Science using Python

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Learning			Program Learning Outcomes (PLO)														
		Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	1 Fundamental Knowledge	2 Application of Concepts	3 Link with Related	4 Procedural Knowledge	5 Skills in Specialization	6 Ability to Utilize	7 Skills in Modeling	8 Analyze, Interpret Data	9 Investigative Skills	10 Problem Solving Skills	11 Communication Skills	12 Analytical Skills	13 ICT Skills	14 Professional Behavior	15 Life Long Learning
CLO-1 :	Learn the fundamentals of Data Science and its methodologies	3	80	70	H	H	M	-	-	-	-	-	H	H	-	-	M	H	H
CLO-2 :	Implementation of data science concepts using python	3	85	75	H	H	H	H	H	-	M	-	H	H	-	-	M	H	H
CLO-3 :	Execution of various libraries in python	3	75	70	H	H	M	H	H	-	M	-	H	H	-	-	M	H	H
CLO-4 :	Knowledge of Machine Learning and Deep Learning using python libraries	3	85	80	H	H	H	-	-	-	-	-	H	M	-	-	M	H	H
CLO-5 :	Exploring the data using various OpenCV and Matplotlib	3	85	75	H	M	M	M	M	M	M	-	H	H	-	M	M	H	H
CLO-6 :	Apply data science concepts using python	3	80	70	H	H	M	-	-	-	-	-	H	H	-	-	M	H	H

Note: All our curriculum, study materials, assignments, quizzes, lab works, and learning resources are personalized and dynamically generated using machine learning models based on the learner's learning ability. Users can review our learning curriculum only through our intelligent learning management platform (iLMSP), and our learning resources and lab infrastructures are available only in the digital form on our cloud infrastructures.

Duration (hour)		18	18	18	18	18
S-1	SLO-1	**Unit 1: Data Science Defined**	Modelling Data	Creating Numpy Array Slicing	Getting Exploratory with Data Analysis	Text Processing In NLTK
	SLO-2	*Data Science Overview*	Modelling Evaluation	Numpy Data Types	Initial Data Exploration with Simple Pandas Functions	Text Processing – Tokenizing
S-2	SLO-1	*Data Science Methodologies Overview*	**Unit 4: Data Science Essential Skill Matrix**	Numpy Array Shape and Reshape	Univariate Analysis	Text Processing – Stop Words
	SLO-2	*Data Science Pipeline*	Introduction to Data Science Essential Skill Matrix	Numpy Data Joins, Split, Search	Biivariate Analysis	Text Processing – Stemming
S-3	SLO-1	*Data Engineering*	Mathematics and Statistical Skills	**Unit 7: Scientific Computing with Python (Scipy)**	**Unit 10: Machine Learning with Scikit-Learn**	Text Processing – Part of Speech

	SLO-2	*Data Preparation, Exploration*	Essential Programming Skills	Getting Started with SciPy	Getting started with Machine Learning with Scikit-Learn	Text Processing – Lemmatizing
S-4	SLO-1	**Unit 2: Data Science vs. Business Intelligence vs Artificial Intelligence**	Data Engineering Skills	SciPy Constants	Getting started with Scikit-Learn	**Unit 13: Computer Vision with OpenCV**
	SLO-2	Data Science vs. Business Intelligence	Data Visualization Skills	SciPy Optimizers	Exploring the Famous Iris Dataset	Getting started with Computer Vision
S-5 to S-6	SLO-1	**Lab 1: Perform Analysis on Simple Dataset I for Data Science and Business Intelligence Applications**	**Lab 4: Perform Analysis on Simple Data for Matehematical, Numerical, Data Engineering Processing**	**Lab 7: Apply Scientific functions on a given dataset with SciPy**	**Lab 10: Install, Import Scikit Learn and Explore Iris Dataset with Pandas for ML Modelling**	**Lab 13: Install, Import OpenCV and Explore an Simple Image for Image Processing**
	SLO-2					
S-7	SLO-1	Data Science vs. Artificial Intelligence	Business and Communication Skills	SciPy Sparse Data	Machine Learning Workflow	Getting started with Computer Vision library OpenCV
	SLO-2	Types of Analysis	Ethical Skills	SciPy Graphs	Simple Machine Learning Implementation with the Iris Dataset	NumPy and Image Basics
S-8	SLO-1	Similarities Between Data Science and Business Intelligence	**Unit 5: Python for Data Science**	SciPy Spatial Data Overview	**Unit 11: Deep Learning with TensorFlow and Keras**	Image Processing with OpenCV
	SLO-2	Data Science alignment with Business Intelligence	Introduction to Python	SciPy Spatial Data Processing		Video Processing with OpenCV
S-9	SLO-1	Data Science Reinforcement with Business Intelligence	Expression and Variables	SciPy Spatial Matlab Arrays	Getting started with Deep Learning with TensorFlow and Keras	Object Detection with OpenCV
	SLO-2	Data Science and Business Intelligence Together: Future	Pythong String Operations	SciPy Interpolation	Getting started with TensorFlow	Object Tracking with OpenCV
S-10	SLO-1	Three Features for Data Science and Business Intelligence	Python Data Structures: List, Tuple, Dictionary, Sets.	**Unit 8: Data Manipulation with Pandas**	Getting started with Keras	**Unit 14: Data Visualization in Python using Matplotlib**
	SLO-2	Getting Started with Data Science, Business Intelligence and AI Journey	Python Conditional Statements		Deep Learning Framework	
S-11 to S-12	SLO-1	**Lab 2: Perform Analysis on Simple Dataset II for Data Science and Business Intelligence Applications**	**Lab 5: Install Python and apply all basic python functions**	**Lab 8: Install, Import Pandas Learn and Explore a Sample Dataset with it**	**Lab 11: Install, Import Tensorflow and Keras. Create a Basic Neural Network with few layers.**	**Lab 14: Install, Import Matplotlib. Explore all the Data Visualization Graphs.**
	SLO-2					

S-13	SLO-1	**Unit 3: Data Science Methodologies**	Python Branching Statements	Getting Started with Data Manipulation with Pandas	Deep Learning Workflow	Getting started with Data Visualization
	SLO-2	Introduction to Data Science Methodologies	Python Case Statements	Installing and Using Pandas	Deep Learning Model Features	Getting started with Data Visualization Library Matplotlib
S-14	SLO-1	Business Understanding	Loops, Funcions and Exception Handling	Exporing a data file Using Pandas	Deep Learning Model Performance	Bar. Column, Pie Graph using matplolib
	SLO-2	Problem Statement Formulation	Objects and Classes	Reading Data from a Excel file	Simple Deep Learning Implementation with the Iris Dataset	Box Plot using matplolib
S-15	SLO-1	Analytic Understanding	**Unit 6: Mathematical Computing with Python (NumPy)**	Reading Data from a .csv file	**Unit 12: Natural Language Processing with NLTK**	Histogram using matplolib
	SLO-2	Understanding Data Requirements	Getting Started with Numpy	Reading Data from a .txt file		Lineplots and Sub Plots Using Matplotlib
S-16	SLO-1	Data Collection	Creating Numpy Arrays	**Unit 9: Exploratory Data Analysis**	Getting started with Natural Language Processing	Scatter Plot Using Matplotlib
	SLO-2	Data Understanding	Creating Numpy Array Indexing	Getting Exploratory with Data Analysis	Getting started with NLP library NLK	Plot Custimizations, Saving Plots
S-17 to S-18	SLO-1	**Lab 3: Collect and Understand a simple data for a Data Science Application.**	**Lab 6: Install and perform a Numerical Array Processing using NumPy**	**Lab 9: Install and perform a simple Exploratory Data Analysis using Pandas**	**Lab 12: Install and perform a simple text processing using NLTK**	**Lab 15: Creata all Data Visualization Plots using Matlotlib**
	SLO-2					

Learning Resources	1. https://deepsphereai.litmos.com/ 2. *Kenneth A. Lambert, (2011), "The Fundamentals of Python: First Programs", Cengage Learning*	1.Jojo Moolayil, "Smarter Decisions : The Intersection of IoT and Data Science", PACKT, 2016. 2. Cathy O'Neil and Rachel Schutt , "Doing Data Science", O'Reilly, 2015. 3. David Dietrich, Barry Heller, Beibei Yang, "Data Science and Big data Analytics", EMC 2013

Learning Assessment											
Level	Bloom's Level of Thinking	Continuous Learning Assessment (50% weightage)								Final Examination (50% weightage)	
		CLA – 1 (10%)		CLA – 2 (10%)		CLA – 3 (20%)		CLA – 4 (10%) #			
		Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice	Theory	Practice
Level 1	Remember	20%	20%	15%	15%	15%	15%	15%	15%	15%	15%
	Understand										
Level 2	Apply	20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
	Analyze										
Level 3	Evaluate	10%	10%	15%	15%	15%	15%	15%	15%	15%	15%
	Create										
	Total	100 %		100 %		100 %		100 %		100 %	

CLA – 4 can be from any combination of these: Assignments, Seminars, Tech Talks, Mini-Projects, Case-Studies, Self-Study, MOOCs, Certifications, Conf. Paper etc.,

Course Designers		
Experts from Industry	Experts from Higher Technical Institutions	Internal Experts
Mr.Jothi, Periyasamy , Chief AI Architect, DeepSphere.AI, CA, USA	Dr.S.Gopinathan, Associate Professor, University of Madras, Chennai	Dr.S.Albert Antony Raj, SRM IST
		Mrs. Sudha, SRM IST, RMP