Course Code	UDS21S02T	Course Name	INTRODUCTION TO MACHINE LEARNING	Course Category	S	Skill Enhancement Course	L	T	P	C
							4	0	0	4

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,	Learning
CLR-1 :	Understand the concept of machine learning	
CLR-2 :	Learn the basics of Demystifying Artifical Intelligent and machine learning	
CLR-3 :	Understand the effectiveness of machine learning in real world applications	
CLR-4 :	Identify the ML implementation framework	
CLR-5 :	Apply ML concepts to solve business problems	
CLR-6 :	Learn the ML Development Hardware and Software Requirements	

Course Learning Outcomes (CLO):	At the end of this course, learners will be able to:	Level of Thinking (Bloom)	Expected Proficiency (%)	Expected Attainment (%)	Program Learning Outcomes (PLO) 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
					Fundamental Knowledge	Application of Concepts	Link with Related	Procedural Knowledge	Skills in Specialization	Ability to Utilize Knowledge	Skills in Modeling	Analyze, Interpret Data	Investigative Skills	Problem Solving Skills	Communication Skills	Analytical Skills	ICT Skills	Professional Behavior	Life Long Learning
CLO-1 :	Understand the Academic and Industry perspectives of ML	2	85	80	H	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-2 :	Learn the concepts of ML & AI	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-3 :	Able to understand the Machine Learmngreal world applications	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-4 :	Grasp the ML implementation framework	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-5 :	Defend the need for ML in providing solution to business problems	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	H
CLO-6 :	Appreciate the application of ML in real world problem solving	3	85	80	L	H	H	H	H	H	-	M	M	L	-	H	-	M	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)		12	12	12	12	12
S-1	SLO-1	**Unit 1: Machine Learning Defined - Academic and Industry Perspective**	**Unit 3: Machine Learning in Real World Applications**	**Unit 6: Machine Learning Implementation Framework**	Regression Problem in Machine Learning	**Unit 10: Machine Learning Data Requirements**
	SLO-2	Getting Started with Machine Learning	AI Applied in Health – Case Management Analysis	Defining a Problem Statement	Simple Linear Regression Problem	Introduction to Data Collection Strategy

S-2	SLO-1	Machine Learning Academic and Industry Definition	AI Applied in Health - Care Management Analysis	Data Collection/Data Preparation/Data Provisioning	Simple Non- Linear Regression Problem	Type of Data needed
	SLO-2	Features of Machine Learning	AI Applied in Health – Patient Redmission Analysis	Feature Engineering	Multiple Linear Regression Problem	Useful Known Features
S-3	SLO-1	Types of Machine Learning	AI Applied in Consumer – Customer Churm Analysis	Model Engineering	Multiple Non- Linear Regression Problem	Source of Data
	SLO-2	Machine Learning Approaches	AI Applied in Consumer – Maket Segmentation	Model Deployment	Clustering Problem in Machine Learning	Amount of Data needed
S-4	SLO-1	Machine Learning Techniques	AI Applied in Consumer – Inventory Stock Analysis	**Unit 7: Machine Learning Classification and Regression Problems**	Association Rule Learning in Machine Learning	Quality of Data needed
	SLO-2	Business Challenges of Machine Leanining	AI Applied in Energy -Power Outage Analysis	Introduction to Machine Learning Regression Problems	Ranking in Machine Learning	Data Privacy and Security
S-5	SLO-1	Business Benefits of Machine Leanining	AI Applied in Oil and Gas - Drilling Analysis	Introduction to Machine Learning Classification Problems	**Unit 9: Machine Learning Models**	Permission to Collect and use data
	SLO-2	Well Defined Machine Learning Problems	AI Applied in Oil and Gas -Rig and Fleet Analysis	Difference Between Regression and Classification Problems	Supervised Machine Learning Models	Potential concerns you may have with providing data
S-6	SLO-1	Designing a Machine Learning System	**Unit 4: Machine Learning Workflow**	Regression – Linear Regression	Unsupervised Machine Learning Models	**Unit 11: Machine Learning Development Hardware and Software Requirements**
	SLO-2	Features of Machine Learning	Understanding Machine Learning Workflow	Regression – Polynomial Regression	Reinforcemnt Machine Learning Models	Understanding the Hardware Specifications
S-7	SLO-1	Goals of Machine Learning	Problem Statement	Regression – Ridge Regression	Linear Regression Model	Understanding the Software Specifications
	SLO-2	Applications of Machine Learning	Data Engineering	Regression – Lasso Regression	Logistic Regression Model	Configuration of Workstations
S-8	SLO-1	**Unit 2: Demystifying Artificial Intelligence and Machine Learning**	Model Engineering	Classification – Logistic Regression	Decision Tree Regressor	Processor Configuration
	SLO-2	Defining Artificial Intelligence	Model Deployment	Classification – Naïve Bayes	Decision Tree Classifier	Motherboard Configuration
S-9	SLO-1	Defining Machine Learning	**Unit 5: Machine Learning Architecture**	Classification – Random Forest	Random Forest Regressor	RAM Configuration
	SLO-2	Artificial Intelligence and Cognitive Technologies	Understanding Machine Learning Architecture	Classification – Random Forest	Random Forest Classifier	Hard Disk Configuration
	SLO-1	Cognitive Technologies	Data Collection	Classification – XGBoost	XGBoost Classifier	GPU Configuration

S-10		Already is Use				
	SLO-2	Impact of Cognitive Technologies	Data Integration	**Unit 8: What Problem Machine Learning Solves**	Support Vector Machines	Scikit Learn
S-11	SLO-1	Features of Cognitive Technologies	Data Provisioning	Getting Started with Machine Learning Problem Types	Naïve Bayes Classifier	Numpy
	SLO-2	Benefits of Cognitive Technologies	Feature Engineering	Understanding Machine Learning Problem Types	K Nearest Neighbour	Pandas
S-12	SLO-1	Growth of Cognitive Technologies	Model Engineering	Classification Problem in Machine Learning	K-means Clustering	SciPy
	SLO-2	Role of Cognitive Technologies in an Enterpriose Implementation	Model Deployment	List of Classification Models	Hierarchical Clustering	Matplotlib

Learning Resources	1. https://deepsphereai.litmos.com/ 2. Introduction to Machine Learning with Python, By Andreas C. Müller and Sarah Guido, October 2016 3. Essential Machine Learning and Pragmatic AI, By Noah Gift, December 2018	4. Stanford Lectures of Andrew Ng. 5. Machine Learning Yearning by Andrew Ng, deeplearning.ai, 2018 6. Hands-On Unsupervised Learning Using Python, By Ankur A. Patel, March 2019 7. Clustering and Unsupervised Learning, By Angie Ma, Gary Willis and Alessandra Stagliano, August 2017Introduction to Machine Learning , Alex Smola and S.V.N. Vishwanathan

Learning Assessment

	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	30%	-	30%	-	30%	-	30%	-	30%	-
	Understand										
Level 2	Apply	40%	-	40%	-	40%	-	40%	-	40%	-
	Analyze										
Level 3	Evaluate	30%	-	30%	-	30%	-	30%	-	30%	-
	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
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