Course Code	21CSE426T	Course Name	FINANCIAL MACHINE LEARNING	Course Category	E	PROFESSIONAL ELECTIVE	L	T	P	C
							2	1	0	3

Pre-requisite Courses	*Nil*	Co- requisite Courses	*Nil*	Progressive Courses	*Nil*
Course Offering Department	*School of Computing*	Data Book / Codes / Standards		*Nil*	

Course Learning Rationale (CLR):	*The purpose of learning this course is to:*
CLR-1:	*learn the machine learning for the finance domain*
CLR-2:	*know to the regression based supervised learning*
CLR-3:	*explore the classification based supervised learning*
CLR-4:	*explore the clustering based unsupervised learning*
CLR-5:	*understand the NLP concepts to study various case studies*

Course Outcomes (CO):	*At the end of this course, learners will be able to:*	Program Outcomes (PO)												Program Specific Outcomes		
		1	2	3	4	5	6	7	8	9	10	11	12			
		Engineering Knowledge	Problem Analysis	Design/development of solutions	Conduct investigations of complex problems	Modern Tool Usage	The engineer and society	Environment & Sustainability	Ethics	Individual & Team Work	Communication	Project Mgt. & Finance	Life Long Learning	PSO-1	PSO-2	PSO-3
CO-1:	*understand the machine learning approach to address finance domain*	-	-	-	-	-	-	-	-	-	-	-	-	-	*1*	-
CO-2:	*implement regression based supervised learning in finance*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*
CO-3:	*implement classification based supervised learning in finance*	-	-	-	-	-	-	-	-	-	-	-	-	*2*	-	-
CO-4:	*implement clustering based unsupervised learning in finance*	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*	-
CO-5:	*understand various case studies with NLP concepts*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	*2*

Unit-1 - Machine Learning in Finance ***9 Hour***

Machine Learning in Finance: Introduction to Machine Learning- Types of Machine Learning, NLP, Python packages for Machine Learning, Introduction and Installation, ANN models in Python-Keras-GPU and cloud services

T1: Identifying Python packages for Machine Learning

T2: Implementing ANN models in python

T3: Using Keras to build Machine Learning models

Unit-2 - Supervised Learning: Regression ***9 Hour***

Supervised Learning- Model Performance-Model Selection-Regression: Time series models, Case Studies-Stock price prediction-Derivative Pricing-Investor Risk Tolerance and Robo-Advisors-Yield Curve Prediction

T4: Using regression model to predict stock price

T5: Using regression model for derivative pricing

T6: Using regression model for yield curve prediction

Unit-3 - Supervised Learning: Classification ***9 Hour***

Supervised Learning: Classification-Case Studies- Fraud Detection-Loan Default Probability-Bitcoin Trading Strategy

T7: Using classification model for fraud detection

T8: Using classification model to identify loan default probability

T9: Using classification model for bitcoin trading strategy

Unit-4 - Unsupervised Learning: Clustering	***9 Hour***
Unsupervised Learning: Clustering – Clustering Techniques-Case Studies-Clustering for Pairs Trading-Portfolio Management: Clustering Investors-Hierarchical Risk Parity *T10: Using clustering model for Pairs trading* *T11: Using clustering model for portfolio management* *T12 Using clustering model for hierarchical risk parity*	
Unit-5 - Natural Language Processing	***9 Hour***
Natural Language Processing packages -Theory and concepts-Case Studies-NLP and Sentiment Analysis–Based Trading Strategies-Chatbot Digital Assistant- Document Summarization *T13: Implement sentiment analysis-based trading strategies using NLP* *T14: Building simple chatbot digital assistant* *T15 Building document summarization using NLP*	

Learning Resources	1. *Hariom Tatsat, Sahil Puri & Brad Lookabaugh (2021). Machine Learning & Data Science Blueprints for Finance-From Building Trading Strategies to Robo-Advisors Using Python, O'Reilly Media, ISBN: 9781492073055* 2. *Jannes Klaas (2019). Machine Learning for Finance. Publisher: Packt Publishing-ISBN: 9781789136364* 3. *Matthew F. Dixon, Igor Halperin and Paul Bilokon (2020). Machine Learning in Finance: From Theory to Practice. Springer Publication-ISBN: 9783030410674*	4. *Bob Mather (2018). Machine Learning in Finance: Use Machine Learning Techniques for Day Trading and Value Trading in the Stock Market. Abiprod Pty Limited.* 5. *German G. Creamer, Gary Kazantsev, and Tomaso Aste (2021). Machine Laerning and AI in Finance. Routledge, an imprint of the Taylor & Francis Group.* 6. *Wesley J.Chun,"Core Python Applications Programming,3rd ed,Pearson,2016*

Learning Assessment

	Bloom's Level of Thinking	*Continuous Learning Assessment (CLA)*				*Summative Final Examination (40% weightage)*	
		Formative CLA-1 Average of unit test (50%)		*Life-Long Learning CLA-2 (10%)*			
		Theory	*Practice*	*Theory*	*Practice*	*Theory*	*Practice*
Level 1	*Remember*	*40%*	-	*20%*	-	*40%*	-
Level 2	*Understand*	*40%*	-	*20%*	-	*40%*	-
Level 3	*Apply*	*10%*	-	*20%*	-	*10%*	-
Level 4	*Analyze*	*10%*	-	*20%*	-	*10%*	-
Level 5	*Evaluate*	-	-	*10%*	-	-	-
Level 6	*Create*	-	-	*10%*	-	-	-
	Total	*100 %*		*100 %*		*100 %*	

Course Designers

Experts from Industry	**Experts from Higher Technical Institutions**	**Internal Experts**
1. *Mr.Vishwa Prasath T S, Technology Analyst Accenture Pvt Ltd*	1. *Mr.C.M.T.Karthikeyan, Asst. Professor, Government College of Engineering - Bargur*	1. *Dr. P.Rajasekar, SRMIST*