20IT6302 – MACHINE LEARNING

Course Category:	Programme Core		Credits:		3
Course Type:	Theory		Lecture-Tutorial-Practice:		2-0-2
Prerequisites:	---		Continuous Evaluation:		30
			Semester End Evaluation:		70
			Total Marks:		100

Course Outcomes	Upon successful completion of the course, the student will be able to:	
	CO1	Understand the fundamental concepts of machine learning
	CO2	Apply linear, distance based, and decision tree based models
	CO3	Analyze probabilistic, neural network models
	CO4	Design a suitable machine learning model for a given scenario

Contribution of Course Outcomes towards achievement of Program Outcomes (1-Low, 2-Medium, 3-High)		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
	CO1	1												1	
	CO2	2	2	3	1	2								3	1
	CO3	2	2	3	1	2								3	1
	CO4	2	3	3	2	2	2		2	3	2	1	2	3	3

Course Content	**UNIT I** **The ingredients of machine learning**: Tasks, Models, Features **Binary classification and related tasks**: Classification, Assessing classification performance, Visualising classification performance **Beyond binary classification**: Multi-class classification, Regression
	UNIT II **Decision Tree learning** – Introduction, Decision tree representation, Appropriate problems for decision tree learning, The basic decision tree learning algorithm, Inductive bias in decision tree, Issues in decision tree learning. **Linear models**: The least-squares method, Multivariate linear regression, Support vector machines, Soft margin SVM, Going beyond linearity with kernel methods.
	UNIT III: **Distance Based Models:** Introduction, Nearest Neighbours classification, Distance based clustering, K-Means algorithms, Clustering around medoids,

	Hierarchical Clustering. **Bayesian Learning:** Introduction, Bayes theorem, Bayes optimal classifier, Naïve Bayes classifier, Bayesian belief networks.
	UNIT IV: **Artificial Neural Networks**: Introduction, Neural network representation, appropriate problems for neural network learning, Multilayer networks and the back propagation, Advanced topics in Artificial Neural Networks **Reinforcement Learning:** Introduction, Learning tasks, Q-learning
Text books and Reference books	**Text Book(s):** 1. Machine Learning: The art and Science of algorithms that make sense of data, Peter Flach, Cambridge University Press, 2012 2. Tom M. Mitchell, Machine Learning, India Edition 2013, McGraw Hill Education **Reference Books:** 1. Aurélien Géron, Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems 2nd Edition 2. Stephen Marsland, "Machine Learning – An Algorithmic Perspective", Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014 3. Ethem Alpaydın, Introduction to machine learning, second edition, MIT press.
E-resources and other digital material	[1]. Kevin Murphy,"Machine Learning:A Probabilistic Perspective" , MIT Press, 2012, https://www.cs.ubc.ca/~murphyk/MLbook/pml-intro-5nov11.pdf [2] Machine Learning by Andrew Ng, Stanford University https://www.coursera.org/learn/machine-learning [3] Professor S. Sarkar IIT Kharagpur "Introduction to machine learning" , https://www.youtube.com/playlist?list=PLYihddLF-CgYuWNL55Wg8ALkm6u8U7gps [4] Professor Carl Gustaf Jansson, KTH, Video Course on Machine Learning https://nptel.ac.in/noc/individual_course.php?id=noc19-cs35

Course Coordinator   **Module Coordinator**   **Program Coordinator**   **Head of the Department**