

Branch Name:	Management (Business Analytics)
Program Code:	MS301
Course Name:	Introduction to AI and Machine Learning
Course Code:	2MS3010644T
Pre-requisite Course:	Basics of computer application, MS Office.

Course Objectives:

- 1) To understand the basic principles of Artificial intelligence
- 2) To understand the basic areas of artificial intelligence including problem-solving, knowledge representation, reasoning, decision-making, planning, perception, and action
- 3) To understand the fundamental concepts of machine learning and its various algorithms

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture (L)	Tutorial (T)	Practical (P)	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	-	4	60	40	-	-	100

Subject Contents:

Sr No.	Topic	Total Hours	Weightage (%)
1	Introduction: Machine learning, Terminologies in machine learning, Types of machine learning: supervised, unsupervised, semi-supervised learning. Discriminative Models: Least Square Regression, 28 Gradient Descent Algorithm, Univariate and Multivariate Linear Regression, Prediction Model, probabilistic interpretation, Regularization, Logistic regression, multi-class classification, Support Vector Machines- Large margin classifiers, Nonlinear SVM, kernel functions, SMO algorithm	10	20
2	Model evaluation and improvement, Regularization, Bias Variance, Hyper- parameter Tuning. Computational Learning theory- Sample complexity, exhausted version space, PAC Learning, agnostic learner, VC dimensions, Sample complexity - Mistake bounds. Gaussian models: Multivariate Gaussian distributions, Maximum Likelihood Estimate, Inferring parameters, Mixture models, EM algorithm for clustering and learning with latent variables	10	20
3	Logic and Knowledge Representation - Knowledge base - Ontology - Commonsense Knowledge Representation of Commonsense knowledge – Graphical models – Belief networks - State space representation – Vector representation - Propositional logic and predicate logic - Propositional and predicate logic - Syntax - Informal and formal semantics - Validity, satisfiability - Semantic entailment - Equivalence - De Morgan's laws - Decidable problems - Many-sorted logic - first-order, aspects of higher-order logic	10	20

4	Automated Reasoning– Formal program techniques: specification by pre-and post-conditions, derivation and verification of programs, invariants. Strategic Reasoning in AI - Agents, strategic behaviors of agents in multiagent systems (MAS) by using the language of alternating-time temporal logic (ATL), an extension of the temporal logics CTL and LTL which allows expressing game-theoretical notions such as the existence of a winning strategy for a group of agents - Expert system-based reasoning - Production system, semantic network, and frame - Soft computing based reasoning – Fuzzy logic	10	20
5	Decision Theory Decision-Making: basics of utility theory, decision theory, sequential decision problems, decision networks, elementary game theory, sample applications; Problem-solving through Search: forward and backward, state-space, blind, heuristic, hill climbing, best-first, A, A*, AO*, minimax, constraint propagation, intelligent search, meta-heuristics, problem-reduction, neural and stochastic; Intelligent agents - reactive, deliberative, goal-driven, utility-driven, and learning agents artificial Intelligence programming techniques; Planning: planning as search, partial order planning, construction and use of planning graph	08	20

Text Books:

Sr. No.	Books
1	Russell, Norvig, Artificial Intelligence: A Modern Approach, Third Edition, Prentice Hall, 2010

Reference Books:

Sr. No.	Books
1	Tsang. Foundations of constraint satisfaction, Academic Press, 1993 3.
2	Gendreau, Michel, and Jean-Yves Potvin, Handbook of metaheuristics, Springer, 2010.
3	MACHINE LEARNING APPLICATIONS IN FINANCE by Dr. Hemant N. Patel, Dr. Mitesh J. Patel, Mr. Sunil P. Patel, and Shakti Bharatbhai Dodiya, Xoffencer International Book Publication House

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the fundamental concepts of Machine Learning (ML) applications in business analytics	Understand
CLO2	Evaluate and improve ML	Evaluate
CLO3	Analyze and apply knowledge representation techniques such as ontology, belief networks, propositional logic, and predicate logic in AI-based decision-making.	Analyse
CLO4	Implement automated reasoning and strategic decision-making models.	Apply
CLO5	Apply decision theory and search algorithms such as for problem-solving and intelligent decision-making.	Apply
CLO6	Develop AI-driven intelligent agents and machine learning models for strategic business applications, enhancing data-driven decision-making.	Create

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)								Program Specific Outcomes (PSOs)	
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PSO1	PSO2
CLO1	H	H	H			M	H	M	H	H
CLO2	H	L	H			H		M	H	H
CLO3	H		L	H			L	M	H	H
CLO4	M	H				M	H	H	M	L
CLO5	M	H	H			H	M	M	L	H
CLO6	H	H	H	H		M	M	L	H	H

H: High, M: Medium, L: Low
