4th Semester MBA Business Analytics Electives

Machine learning			
Course Code	**22MBABA403**	CIE Marks	50
Teaching Hours/Week (L:P:SDA)	2:2:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03

Course Learning objectives:

- To acquaint students with theoretical and practical knowledge on machine learning.
- To make students to apply the concepts of Machine learning
- To make students to understand the technology integration and importance of data analytics
- To make students to analyse using the Machine learning techniques for business decisions

Module-1 6 Hours

Introduction to Machine Learning: Creativity and motivation, Computer hardware architecture, understanding programming, word and sentence, Conversing with Python, Terminology, Debugging, The learning journey.

Module-2 6 Hours

Supervised and Unsupervised Learning : Regression and classification models, Decision tree, Classification of regression trees, linear, multiple, logistic regression ,neutral networks, multi layer perception ,support vector machines, linear and non-linear kernel functions, introduction to clustering and k model clustering.

Module-3 7 Hours

Decision tree and generic algorithms: Basic decision tree algorithm, information gain, hypothesis space, inductive bias, issues in decision tree learning, determining the correct and final tree size, purning. Genetic Algorithms: Motivation, Genetic Algorithms: Representing Hypotheses, Genetic Operator, Fitness Function and Selection, An Illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning: Lamarkian Evolution, Baldwin Effect, Parallelizing Genetic Algorithms.

Module-4 7 Hours

Ensemble and probabilistic learning: Model Combination Schemes, Voting, Error-Correcting Output Codes, Bagging: Random Forest Trees, Boosting: Adaboost, Stacking. Gaussian mixture models - The Expectation-Maximization (EM) Algorithm, Information Criteria, Nearest neighbour methods - Nearest Neighbour Smoothing, Efficient Distance Computations: the KD-Tree, Distance Measures

Module-5 7 Hours

Reinforcement Learning and Evaluating Hypotheses: Learning Task, Q Learning, Non deterministic Rewards and actions, temporal-difference learning, Relationship to Dynamic Programming, Active reinforcement learning, Generalization in reinforcement learning.
Motivation, Basics of Sampling Theory: Error Estimation and Estimating Binomial Proportions, The Binomial Distribution, Estimators, Bias, and Variance

Module-6 7 Hours

Introduction to Virtual Reality and Virtual Environment: Computer and Real time computer graphics, Flight Simulation, Virtual environment requirement, benefits of virtual reality
Augmented Reality: Taxonomy, technology and features of augmented reality, difference between AR and VR, Challenges with AR, AR systems and functionality, Augmented reality methods, visualization techniques for augmented reality, enhancing interactivity in AR environments, evaluating AR systems.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks. Minimum passing marks in SEE is 40% of the maximum marks of SEE. A student shall be deemed to have satisfied the academic requirements (passed) and earned the credits allotted to each course if the student secures not less than 50% in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

There shall be a maximum of 50 CIE Marks. A candidate shall obtain not less than 50% of the maximum marks prescribed for the CIE.

CIE Marks shall be based on:

a) Tests (for 25Marks) and
b) Assignments, presentations, Quiz, Simulation, Experimentation, Mini project, oral examination, field work and class participation etc., (for 25 Marks) conducted in the respective course. Course instructors are given autonomy in choosing a few of the above based on the subject relevance and should maintain necessary supporting documents for same.

Semester End Examination:

The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.

- The question paper will have 8 full questions carrying equal marks.
- Each full question is for 20 marks with 3 sub questions.
- Each full question will have sub question covering all the topics.
- The students will have to answer five full questions; selecting four full questions from question number one to seven in the pattern of 3, 7 & 10 Marks and question number eight is compulsory.
- No Laboratory exam for this course.

Suggested Learning Resources: Books:

1. Tom M. Mitchell, “Machine Learning”, McGraw-Hill, 2010.
2. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995

3. EthemAlpaydin, (2004) "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press
4. T.astie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer(2nd Ed.), 2009

Web links and Video Lectures (e-Resources):

- https://r.search.yahoo.com/_ylt=AwrKEtVjfPdijgcUVXy7HAx.;_ylu=Y29sbwNzZzMEcG9zAzEEdnRpZAMEc2VjA3Ny/RV=2/RE=1660415204/RO=10/RU=https%3a%2f%2fwww.globalsqa.com%2ffree-machine-learning-

- https://r.search.yahoo.com/_ylt=AwrKEtVjfPdijgcUV3y7HAx.;_ylu=Y29sbwNzZzMEcG9zAzIEdnRpZAMEc2VjA3Ny/RV=2/RE=1660415204/RO=10/RU=https%3a%2f%2fai.stanford.edu%2f~nilsson%2fMLBOOK.pdf/RK=2/RS=KWhp7r2qOpmAwpK8yjApfSnMirE-

Note: The aforesaid links and study materials are suggestive in nature, they may be used with due regards to copy rights, patenting and other IPR rules.

Skill Development Activities Suggested

- Practice on visualisation of data tools and understand the machine interaction
- Analyse the Google map for traffic congestion in a big city if IOT is implemented
- Learn simple algorithms and solve business problems using decision tree and simulations

Course outcome:

At the end of the course the student will be able to :

Sl. No.	Description	Blooms Level
CO1	Understand the concepts of Machine learning	L2
CO2	Apply the knowledge of Data visualisation and accurate decision making	L3
CO3	Analyse the Big data and pattern using machine learning algorithms	L4
CO4	Evaluate the Data Structure and provide immersive experience to users	L5

.02.2023

Mapping of COS and Pos

	PO1	PO2	PO3	PO4	PO5	PSO 1	PSO 2	PSO 3	PSO 4
CO1	1				2	3			
CO2		2	2				2		
CO3				3		3		2	
CO4		2		2			1		2

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