

Approved in 52nd BoA Meeting(02.11.2023)

Proposal for New Course		
Course Number	:	MB522
Course Name	:	Machine Learning for Business
Credits	:	2-0-0-2 (L-T-P-C) ¹
Prerequisites	:	None
Intended for	:	MBA
Distribution	:	Compulsory
Semester	:	Even

Preamble

Machine learning is increasingly playing an important role in the mainstream business applications. It concentrates on how the natural ability of human beings to learn from environment can be embedded in machines. With rapid technological advancements of sensor technology necessitates to improve machine learnability to deal with huge amount of data available on real time basis. The real-time decision making becoming an integral part of majority of business decisions, and this necessitates to increase the capability of the learning methods to process efficiently and effectively the available data. This course is going to address the nuances of machine learnability and their applications in business. This course will focus on demystifying machine learning concepts, use cases and implementation issues to be faced by the business professionals. This course focuses on the managerial aspects the machine learning to arrive at most appropriate decision.

Objective

On completion of this course, the student should be able to:

- Identify which industry and company will be affected and to what extent.
- Understand how machines help making business decisions through learning from the context, formulate solution and implement it.
- Capitalize on the ML tools and techniques to support company's digital journey.
- Acquire the knowledge to discover opportunities in business to drive it through innovation and efficiency.
- Realize the current capabilities and future possibilities of machine learning applicability in business.

¹ L= Lectures per week, T=Tutorials per week – P = Practical/Lab session per week – C = Credits for course

Course Modules with Quantitative lecture hours		
Module 1	Introduction to Machine Learning	(3)
Understanding what is ML, its purpose, how and when to use it in Business, ML and Statistics- similarities and contrasts, Data driven decision making, ML methods.		
Module 2	Machine Learning and Data Analytics	(3)
Data Models- Linear vs. Non-linear, complicated vs. Complex models for real world problem solving; ML system requirements, Iterative ML development Process, Framing ML Problems; feature understanding and selection.		
Module 3	Supervised Learning: Fundamentals	(5)
Learning from data, bias and variance, Model generalization- Overfitting and underfitting, Predictive modeling, data and target leakage, Data sets preparation for model building- Training, Testing and Validation datasets, cross validation, linear and logistic regression, K-nearest neighbor method, Business applications (appropriate case studies, use cases and situation analysis)		
Module 4	Supervised Learning: Decision Trees	(8)
Fundamentals of decision trees, evaluating splits- information gain, Gini Index, applications (eg. Business use cases like Churn analysis/credit scoring etc.), Diversity and prediction; Ensemble of Learners- Multiple Models: Condorcet Jury Theorem and Diversity Prediction Theorem, random forest, AdaBoost, Model evaluation, comparison, interpretation and communication, Business applications (appropriate case studies, use cases and situation analysis)		
Module 5	Supervised Learning: Support Vector Machine (SVM)	(4)
Fundamentals of support vector machines (SVMs); Linear SVM classification- hard margin classification, soft margin classification; Non-linear separation- a step towards neural network, Predicting continuous variables, Business applications (appropriate case studies, use cases and situation analysis)		
Module 6	Unsupervised Learning	(5)

Clustering Basics, Techniques used for clustering; k-means clustering- choosing k: elbow method, silhouette method; Density-based and hierarchical clustering methods; Principal Components analysis (PCA), Business applications (appropriate case studies, use cases and situation analysis)

Lab Exercises (If applicable):

Nil.

Textbooks:

Reference Book:

1	Provost, F and Fawcett, T., Data Science for Business, Shroff Publishers and Distributors Pvt. Ltd, 2014.
2	Daniel S. Becker and Kai R. Larsen, Automated Machine Learning for Business, Oxford University Press, 2021.
3	Ethem Alpaydin (2016), Machine Learning, MIT Press
4	H. Brink, J.W. Richards and M. Fetheerolf (2017), Real-world Machine Learning, Manning Pub.
5	J. Kelleher, B.M. Namee and A. D'Árcy (2015). Fundamentals of Machine Learning for Predictive Data Analytics, MIT Press. (JK)
6	Scot Page (2018). The Model Thinker, Basic Books
7	K. Hosanagar (2019). A human guide to Machine intelligence, Portfolio, Penguin Random House
8	Matthew Kirk (2019). Thoughtful Machine Learning with Python, Shroff Publishers and Distributors Pvt. Ltd.
9	Chip Huyen (2022), Designing Machine learning Systems, Shroff Publishers and Distributors Pvt. Ltd.