# 20CS41E2 - MACHINE LEARNING APPLICATIONS

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| Course Category: | Professional Elective | Credits: | 3 |
| Course Type: | Theory | Lecture-Tutorial-Practical: | 3-0-0 |
| Prerequisite: | Mathematical concepts such as Statistics, Linear Algebra, Calculus, and Probability.Basic programming skills.Knowledge in data mining and warehousing. | Sessional Evaluation:Univ. Exam Evaluation:Total Marks: | 4060100 |
| Objectives: | * To discover patterns in the user data and then make predictions and intricate patterns for answering business questions and solving business problems.
* Machine learning in business and other fields is effectively a method of data analysis that works by automating the process of building data models.
* Machine learning helps in analysing the data as well as identifying trends.
* To be able to formulate machine learning problems corresponding to different applications.
* To be able to apply machine learning algorithms to solve problems of moderate complexity
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| Course Outcomes | Upon successful completion of the course, the students will be able to: |
| CO1 | Learn Basics of Machine Learning and which Real time applications are Using Machine Learning Techniques,  |
| CO2 | Analyze the various Supervised Learning Algorithms- Classification Algorithms, how these algorithms are applied for real time Applications |
| CO3 | Analyse the various Regress Algorithms- Regression Algorithms, how these algorithms are applied for real time Applications and analyse the various Unsupervised Learning Algorithms, how these algorithms are applied for real time Applications. |
| CO4 | Analyse Artificial neural network algorithms for Real time applications. |
| CO5 | Learn the Concept of Reinforcement Learning and working models for applications. |
| CO6 | Understand the fundamental concepts of Genetic Algorithm and Analyze and design the genetic algorithms for optimization engineering problems |
| Course Content | UNIT-I**Introduction:** What is Machine Learning? Why you use Learning, Life cycle of Machine Learning, Main challenges of Machine Learning, Types of Machine Learning algorithms, Applications of Machine Learning**Python Framewoks:** Numpy, Scipy, Scikit-learn, Theono, Tensorflow, Keras, PyTorch, Pandas, Matplotlib tools to Implement Machine Learning Algorithms.UNIT-II**Supervised Learning-I**: Classification Algorithms-Concept Learning, Decision Tree Learning, Naive Bayes Classifier, K-Nearest Neighbour, Real Time Applications of Classification Algorithms, Implementation of Decision Tree and K-Nearest Neighbour using Python Frameworks.**Supervised Learning-II:** Logistic Regression, Support Vector Machines, Implementation of Logistic Regression, and Support Vector Machines using Python Frameworks.UNIT-III**Regression Algorithms**: Linear Regression, Polynomial Regression, Real Time Applications of Regression Algorithms, Implement Linear Regression using Python Frameworks.**Unsupervised Learning:** Clustering Algorithms- K-Means Clustering, Implementation of K-means clustering using Python Frameworks. Dimensionality Reduction- Principal Component Analysis, Implementation of Principle Component Analysis using Python Frameworks, Hidden Markov Model. Real Time Applications of Clustering Algorithms.UNIT-IV**Artificial Neural Networks:** Introduction, Neural Network representation, Appropriate problems, Perceptron, Multilayer Networks and Back Propagation Algorithm, Implementation of Back Propagation Algorithm using Python Frameworks, Applications of Artificial Neural Networks.UNIT-V**Reinforcement Learning:** What is Reinforcement Learning, How Reinforcement Learning works with Example, Characteristics of Reinforcement Learning, Learning Models of Reinforcement Learning-Markov Decision Process, Q-Learning, and Implementation of Q-learning with Python Frameworks, Real Time Applications of Reinforcement Learning. UNIT-VI**Genetic Algorithms:** What is Genetic Algorithm, Operators of Genetic Algorithms, How Genetic Algorithm works with illustrative example, Flow Chart for Genetic Programming, Implementation of Genetic Algorithm in Python Frameworks, Real Time Applications of Genetic programming. |
| Text Books &ReferenceBooks | **TEXT BOOKS:**1. Tom M. Mitchell, Machine Learning@1997.
2. WEI-MENG LEE, Python Machine Learning, Wiley, 2019

**REFERENCE BOOKS:**1. O’Reilly, Hands on Machine Learning with Scikit-Learn and Tensor flow@ 2017
2. Ethem Alpaydin, Introduction to Machine Learning, MIT Press, Third Edition.
3. Rudolph Russell, Machine Learning Step by step guide to implement Machine Learning Algorithms with Python@2018.
4. Shai Shalev Shwartz, Understanding Machine Learning from Theory to Algorithms, Cambridge University Press, 2014
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| E-Resources | 1. <https://www.javatpoint.com/artificial-neural-network-genetic-algorithm>
2. <https://www.geeksforgeeks.org/genetic-algorithms/>
3. <https://www.geeksforgeeks.org/ml-logistic-regression-using-python/>
4. <https://nptel.ac.in/courses/108104049/>
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