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| I:\OFFICE\Darshan University\Logo\Darshan-University-Logo-horizontal-color.png | **Graduation Level:** | Bachelor of Technology (B.Tech.) |
| **Course:** | Professional Core |
| **Subject Name:** | Machine Learning |
| **Subject Code:** | 2301CS621 |
| **Semester:** | 6 |

**Type of Course:**

**Prerequisites:** Nil

**Course Objective / Rationale:**

This course introduces the fundamental concepts of Machine Learning. The students will learn the basics of machine learning, its application, supervised & unsupervised learning.

**Teaching & Examination Scheme:**

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Teaching Scheme | | | Credits | Examination Marks | | | | Total Marks |
| L | T | P | C | Theory Marks | | Practical Marks | |
| ESE (E) | PA (M) | ESE (V) | PA (I) |
| 3 | 0 | 2 | 4 | 70 | 30 | 25 | 25 | 150 |

**Contents:**

|  |  |  |  |
| --- | --- | --- | --- |
| Unit No. | Topic | Total Hours | Weightage % |
| 1 | **Introduction to Machine Learning**  Overview of AI,ML and DL, History of ML, How ML works, ML Life cycle, ML Terminology, Types of Learning: Supervised, Unsupervised, Reinforcement, Tools and Technology for Machine Learning, ML Application, issues in ML, Overview of Computational Learning Theory, Evaluation Metrics. | 8 | 20 |
| 2 | **Supervised Learning**  **Regression**: Introduction to Regression, Linear Regression, Multiple Linear Regression, Polynomial Regression, Ridge,Logistic Regression, SVR  **Classification:**  decision trees, probabilistic (conditional and generative), k- Nearest Neighbour, SVC  Model Selection & Evaluation techniques:  Ensemble Learning: Bagging, Random Forest, Boosting, Underfitting and Overfitting, Bias and Variance | 12 | 25 |
| 3 | **Unsupervised Learning**  Distance based clustering, Hierarchical Clustering, Density based clustering,  Outlier Detection Methods | 7 | 15 |
| 4 | **Artificial Neural Networks**  Overview of Artificial Neural Networks, History of ANN, How ANN works Multilayer Perceptron, Activation Functions and Hyper parameter Tuning, Back propagation, multilayer neural network. | 8 | 20 |
| 5 | **CNN**  Introduction to CNN, Architecture of CNN, Working of CNN, Activation Functions in CNN, Hyperparameter Tuning, Regularization Techniques. | 10 | 20 |

**Suggested Specification Table with %Marks (Theory)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Distribution of Theory Marks %** | | | | | |
| **R Level** | **U Level** | **A Level** | **N Level** | **E Level** | **C Level** |
| **10** | **30** | **60** | **0** | **0** | **0** |

R: Remembrance; U: Understanding; A: Application, N: Analyse; E: Evaluate and C: Create and above Levels (Revised Bloom’s Taxonomy)

**Suggested List of Experiments / Exercises:**

**Course Outcome:**  After completing this course students will be able to

|  |  |
| --- | --- |
| Sr. No. |  |
| 1 | **describe** the fundamentals of machine learning with its types. |
| 2 | **demonstrate** the strategy for dimensionality reduction and regression. |
| 3 | **solve** the real-world problems using supervised algorithms. |
| 4 | **apply** unsupervised machine learning techniques for problem solving. |
| 5 | **discuss** overview of Artificial Neural Networks. |

**Design based Problems (DP)/Open-Ended Problem: (If Any)**

**Learning Resources:**

1. **Text & Reference Books:**
   * Machine Learning By Tom M. Mitchell | McGraw Hill
   * Introduction to Machine Learning By Ethem Alpaydin | PHI
   * Machine Learning: An Algorithmic Perspective By Stephen Marsland | Taylor & Francis
2. **Major Equipment:**
3. **Software:**
4. **Learning Websites:**