

|                              |                                                                                     |
|------------------------------|-------------------------------------------------------------------------------------|
| <b>Branch Name:</b>          | MCA                                                                                 |
| <b>Program Code:</b>         | CS201                                                                               |
| <b>Course Code</b>           | 4CS2010304T                                                                         |
| <b>Course Title</b>          | Fundamentals of Machine Learning                                                    |
| <b>Pre-requisite Course:</b> | Basics of computer science including algorithms, data structure, probability theory |

**Course Objective:**

1. To learn various machine learning algorithms & their area of applications.
2. To learn the process of formulating & solving real world problems using machine learning.
3. To learn the implementation of various decision making problems using machine learning.

**Teaching and Examination Scheme:**

| Teaching Scheme (Hours per week) |          |           |        | Evaluation Scheme (Marks) |                       |                       |                       |       |
|----------------------------------|----------|-----------|--------|---------------------------|-----------------------|-----------------------|-----------------------|-------|
| Lecture                          | Tutorial | Practical | Credit | Theory                    |                       | Practical             |                       | Total |
|                                  |          |           |        | University Assessment     | Continuous Assessment | University Assessment | Continuous Assessment |       |
| 3                                | -        | -         | 3      | 60                        | 40                    | -                     | -                     | 100   |

| Unit No | Topics                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Total Hours | Weightage (%) |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|---------------|
| 1       | <b>Introduction to Machine Learning:</b> Introduction to Machine Learning: Overview of Human Learning and Machine Learning, Types of Machine Learning, Applications of Machine Learning, Tools and Technology for Machine Learning.                                                                                                                                                                                                                                                                     | 05          | 10            |
| 2       | <b>Preparing to Model:</b> Preparing to Model: Machine Learning activities, Types of data in Machine Learning, Structures of data, Data quality and remediation, Data Pre-Processing: Dimensionality reduction, Feature subset selection.<br><br><b>Feature Engineering:</b> Basics of Feature Engineering: Feature and Feature Engineering, Feature transformation: Construction and extraction, Feature subset selection : Issues in high-dimensional data, key drivers, measure and overall process. | 10          | 20            |
| 3       | <b>Modeling and Evaluation</b><br><br>Selecting a Model: Predictive/Descriptive, Training a Model for supervised learning, model representation and interpretability, Evaluating performance of a model, Improving performance of a model.                                                                                                                                                                                                                                                              | 08          | 20            |
| 4       | <b>Supervised Learning: Classification and Regression:</b>                                                                                                                                                                                                                                                                                                                                                                                                                                              | 07          | 25            |

|          |                                                                                                                                                                                                                                                                                                                                           |    |    |
|----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----|----|
|          | Example of Supervised Learning, Classification Model, Classification Learning Steps, Common Classification Algorithms<br>Example of Regression, Common regression Algorithms                                                                                                                                                              |    |    |
| <b>5</b> | <b>Unsupervised Learning:</b><br><br>Unsupervised Learning versus Supervised Learning, Applications of Unsupervised Learning, Clustering, Finding Pattern using Association Rules<br><br><b>Neural network</b><br>Introduction to neural network, Biological and Artificial Neurons, Types of Activation functions, Implementation of ANN | 08 | 25 |

**Text Books:**

1. Saikat Dutt, Subramanian Chandramouli, Amit Kumar Das , “Machine Learning”, Pearson Education

**References Books:**

1. Tom M Mitchell, “Machine Learning”, McGraw Hill,
2. Anuradha Srinivasaraghavan, Vincy Joseph, “Machine Learning”, Wiley India
3. Peter Harrington, Machine Learning in Action, DreamTech

**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, including types of machine learning, applications, and commonly used tools and technologies.                                     | 2.Understand             |
| CLO2 | Apply data preparation techniques such as data preprocessing, dimensionality reduction, and feature engineering to improve the quality of machine learning datasets.                      | 3.Apply                  |
| CLO3 | Analyze and select appropriate machine learning models for different types of problems and evaluate model performance using suitable evaluation techniques.                               | 4.Analyze                |
| CLO4 | Implement supervised learning techniques including classification and regression algorithms for solving predictive problems.                                                              | 4.Apply                  |
| CLO5 | Explain and apply unsupervised learning methods such as clustering and association rule mining, and understand the basic concepts of artificial neural networks and activation functions. | 2.Understand<br>3. Apply |

**Mapping of CLOs with POs & PSOs**

| Course Learning Outcomes | Program Out comes( POs) |     |     |     |     |     |     |     |     |      |      |      | Program Specific Outcomes (PSOs) |      |
|--------------------------|-------------------------|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|----------------------------------|------|
|                          | PO1                     | PO2 | PO3 | PO4 | PO5 | PO6 | PO7 | PO8 | PO9 | PO10 | PO11 | PO12 | PSO1                             | PSO2 |
| CLO1                     | H                       | L   | -   | -   | M   | -   | L   | -   | -   | -    | -    | -    | M                                | L    |
| CLO2                     | H                       | M   | L   | L   | M   | -   | L   | -   | -   | -    | -    | -    | H                                | M    |
| CLO3                     | H                       | H   | M   | M   | M   | -   | L   | -   | -   | -    | -    | -    | H                                | M    |
| CLO4                     | M                       | M   | H   | L   | H   | -   | L   | -   | -   | -    | -    | L    | H                                | M    |
| CLO5                     | M                       | M   | M   | L   | M   | -   | L   | -   | -   | -    | -    | L    | M                                | M    |

**H:High, M:Medium, L:Low**