Course Title:	Machine Learning
Course Code:	CSTA-304
Semester:	VIII
Credit Hours:	3 Credit Hours

Learning Outcomes
By the end of this course, students will be able to:
1. Learn the basic concepts and techniques of Machine Learning.
2. Develop the skills of using recent machine learning software for solving practical problems.
3. Gain hands-on experience of doing independent study and research.

Course Outline
Unit 1
1.1 Introduction to machine learning
Machine learning and pattern recognition. Supervised learning: Linear and non-linear regression, Non-parametric methods, Support vector machines and large-margin classifiers, Kernel methods, Model/Feature selection.
Unit 2
2.1 Unsupervised Learning
Clustering algorithms, K-means, Expectation-maximization, Gaussian mixture models, Anomaly detection, artificial neural networks.
2.2 Reinforcement Learning
Markov decision processes and Ensemble learning: Bagging, random forests, and boosting.

- **Teaching-learning Strategies:**

Class Lecture method, which includes seminars, discussions, assignments and projects. (Audio-visual tools are used where necessary)

- **Assignments-Types and Number with calendar:**

According to the choice of respective teacher.

- **Assessment and Examinations:**

According to the University's Semester Rules.

Sr. No.	Elements	Weightage	Details
1	Midterm Assessment	35%	It takes place at the mid-point of the semester.
2	Formative Assessment	25%	It is continuous assessment. It includes: Classroom participation, attendance, assignments, and presentations, homework, attitude and behavior, hands-on-activities, short tests, quizzes etc.
3	Final Assessment	40%	It takes place at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.

Text Book
1. Bishop, C. M. (2006). *Pattern recognition and machine learning.* Springer.

Suggested Readings
1. Alpaydin, E. (2014). *Introduction to machine learning*. MIT press.
2. Marsland, S. (2011). *Machine learning: an algorithmic perspective*. Chapman and Hall/CRC.