Course Name: Machine Learning **Course Code: ITEC314**

General Information						
Course Code	**ITEC 314**	**Level/Year**	**6 / 3**	**Required (R) / Selected Elective (SE)**		**SE**
Credit Hours	**Theory**	**2**	**Lab**	**1**	**Total**	**3**
Prerequisites	**ITEC313**	**Course Coordinator**		**Dr. John Martin R**		
Corequisites	**-**	**Track Name**		**Data Mining**		

Course Description

This Machine Learning course provides a comprehensive introduction to fundamental ML concepts, covering supervised, unsupervised, and reinforcement learning techniques. Students will explore key topics such as Bayesian decision theory, classification, regression, dimensionality reduction, clustering, deep learning, and reinforcement learning methodologies. The course also emphasizes the design and analysis of ML experiments, including cross-validation, bootstrapping, and performance evaluation. Alongside theoretical instruction, hands-on lab sessions reinforce concepts through practical implementation, ensuring a strong understanding of real-world applications.

Course Objectives : On completion of the course, the student will be able to:

- Comprehend the fundamental concepts, types, and challenges of machine learning.
- Select suitable machine learning models, including supervised, unsupervised, and reinforcement learning techniques, for various data-driven problems.
- Implement ML problems to solve real-world challenges.
- Design and analyze ML experiments using cross-validation, bootstrapping, and performance evaluation metrics.
- Integrate theory with practice through hands-on lab experiments, using key ML concepts and methodologies.

Course Contents

List of Topics	Weeks
CH 1: Machine Learning Basics	1, 2, 3
CH 2: Supervised Learning	4, 5, 6
CH 3:Unsupervised Learning	7, 8
CH 4: Deep and Reinforcement Learning	9, 10
CH 5: Design and Analysis of ML Experiments	11, 12, 13

Textbook

- Ethem Alpaydin, Introduction to Machine Learning
- Stephen Marsland, Machine Learning – An Algorithmic Perspective‖

Reference Materials

- Peter Flach, Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖
- Chris Bishop, Pattern Recognition and Machine Learning
- Tom M Mitchell, Machine Learning
- Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals

Course Learning Outcomes

CLO	Description	Mapped PI
CLO#01	**Gain** a solid understanding of core machine learning principles.	PI 1.3
CLO#02	**Understand** and **relate** the principles of Bayes decision theory, parametric methods, and multivariate methods, with machine learning based decision scenarios.	PI 1.4
CLO#03	**Examine** the process of learning a class, critically evaluating the factors that contribute to effective class learning in supervised machine learning.	PI 2.1
CLO#04	**Select and use** dimensionality reduction, clustering, deep learning, and reinforcement learning techniques in various data problems, demonstrating a hands-on understanding of these algorithms and methodologies.	PI 2.3
CLO#05	**Evaluate** various performance measures used in machine learning, comparing their suitability for different tasks and understanding the implications of selecting specific metrics.	PI 2.4
CLO#06	**Implement** real world machine learning problems and **interpret** their results.	PI 3.1, PI 3.3

CLO-PI-SO Mapping

	SO-1	SO-2	SO-3	SO-4	SO-5	SO-6
CLO#01	PI1.3	-	-	-	-	-
CLO#02	PI1.4	-	-	-	-	-
CLO#03	-	PI2.1	-	-	-	-
CLO#04	-	PI2.3	-	-	-	-
CLO#05	-	PI2.4	-	-	-	-
CLO#06	-	-	PI3.1, PI3.3	-	-	-