COURSE CODE:	ENS-441		
COURSE NAME:	Data Science		
CREDIT HOURS:	Theory = 02	Practical = 01	Total = 03
CONTACT HOURS:	Theory = 32	Practical = 48	Total = 80
PREREQUISITE:	None		
MODE OF TEACHING:	Instruction: 2 hours of Lecture per week (67%) Lab Demonstration: 3 hours of Lab work per week (33%)		

Course Description:

This course provides an overview of fundamental data warehousing and data mining concepts. It introduces the concepts and strategies necessary to build and deploy a data warehouse as a decision support tool for an enterprise. Different data mining techniques e.g. classification, clustering would also be covered in this course.

TOPICS COVERED:

Week#	Topics
1	Introduction to data mining and data warehousing
2	Data preprocessing: Data summarization
3	Data cleaning, Data integration
4	Data Transformation, Data Reduction, Data discretization
5	Concept hierarchy generation
6	Data Warehouse and OLAP Technology
7	Multidimensional data model, Data warehouse architecture, Data Cube Computation
8	Data Generalization. Mining Frequent Patterns, Associations, and Correlations
9	**Midterm Exam – MSE**
10	Basic Concepts and Methods Classification and Prediction: Classification vs. Prediction, Decision tree induction
11	Bayesian classification, Support Vector Machines, Prediction accuracy and

	error
12	Ensemble methods, Model selection
13	Cluster Analysis: Partitioning methods. Hierarchical methods
14	Density-based methods. Grid-based methods
15	Model-based clustering. Constraint-based cluster analysis
16	Outlier analysis. Evaluation-Classification and Clustering
17	Outlier analysis. Evaluation-Classification and Clustering
18	**End Semester Exam**

Lab Work:

Week#	Topics
1	General Introduction
2	Setting up the environment/Software installation
3	Understanding the dataset
4	Creating different data warehouse architectures from relational database
5	Applying Extract, Transform and Load (ETL)
6	Applying data pre-processing techniques on a data set-1
7	Applying data pre-processing techniques on a data set-2
8	Applying data mining techniques on a data set-Pattern Mining
9	**Midterm Exam – MSE**
10	Applying data mining techniques on a data set-Correlation
11	Applying data mining techniques on a data set-Classification (Part 1)
12	Applying data mining techniques on a data set-Classification (Part 2)
13	Applying data mining techniques on a data set-Clustering (Part 1)
14	Applying data mining techniques on a data set-Clustering (Part 2)
15	Applying visualization techniques
16	Group project
17	Group project
18	**End Semester Exam**

Tools / Software Requirement

MySQL Server/PostgreSQL, Talend, Weka, R /Python

Text and Material:

1. Textbook: Jiawei Han, Jian Pei, Hanghang Tong, Data Mining: Concepts and Techniques, ISBN: 9780128117613 (4th Edition), 2022.
2. Reference Book: Data Mining: Practical Machine Learning Tools and Techniques (4th Edition) by Ian H. Witten, Eibe Frank, Mark A. Hall and Christopher J. Pal, 2016.

ASSESMENT SYSTEM:

Theoretical/Instruction	100%
Assignments	10%
Quizzes	15%
Mid Semester Exam	25%
End Semester Exam	50%

Practical Work	100%
Lab Work	70%
Lab Exam/Projects	30%