MODULE **DESCRIPTOR**

MODULE TITLE	Knowledge Discovery		
MODULE CODE	CO4762 (L7)	**CREDIT VALUE**	20 Credits (10 ECTS)
SCHOOL	SCHOOL OF SCIENCE		

MODULE **AIMS**

This module considers the concepts and applications of knowledge discovery. It discusses the architecture of data-warehouses and the processes involved in their creation and maintenance. A useful range of important techniques used to data-mine large datasets — to visualise, explore, and find unsuspected patterns, clusters, correlations, connections etc. — are discussed.

The main objectives of the module are to:

- Understand the value of knowledge discovery in solving real-world problems
- Understanding of foundational concepts underlying data mining.
- Evaluate important knowledge discovery techniques
- Apply a wide range of knowledge discovery tools to real-world problems.
- Evaluate the processes involved in the creation and maintenance of data warehouses.

MODULE **CONTENT**

Knowledge Discovery Concepts: Data, Databases, Data Warehouses, Patterns, Technologies, Applications, Research Directions.

Data Preprocessing: Cleaning, Integration, Reduction, Transformation

Data Warehousing and OLAP: Architectures, Modelling, Data Cubes, OLAP, Design and Usage, Implementation

Frequent Patterns, Associations, and Correlations: Basic Concepts, Apriori Algorithm, Generating Association Rules from Frequent Itemsets, Pattern-Growth Approach, Mining Frequent Itemsets Using Vertical Data Format, Mining Closed and Max Patterns, Pattern Evaluation, Advanced Pattern Mining

Classification: Basic Concepts, Decision Tree Induction, Bayes Classification Methods, Rule-Based Classification, Model Evaluation and Selection, Support Vector Machines, Neural Networks, Advanced Methods

Cluster Analysis: Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Advanced Methods

Outlier Detection: Outliers and Outlier Analysis, Methods, Statistical Approaches, Statistical Approaches,

Selected Topics in Knowledge Discovery: Personalized exploration, guided analysis, Data Mining and Society

INTENDED **LEARNING OUTCOMES**

On successful completion of this module a student will be able to:

1.	Describe data-mining techniques and assess their applicability
2.	Evaluate models/algorithms with respect to their accuracy
3.	Critique the results of a data mining exercise
4.	Develop hypotheses based on the analysis of the results obtained and test them
5.	Make judgements about case studies through the assessment of discovered criteria from data mining

TEACHING METHODS

Lectures deliver factual material, introduce key concepts, direct reading and relate academic aspects to practical considerations.

Tutorial sessions allow students to apply the techniques and reinforce the material delivered in the lecture.

Practical sessions enable students to discuss material and complete online or paper-based exercises.

The module will be assessed by one written coursework. The assignment requires the student to apply specific knowledge discovery techniques on datasets to reveal important findings and summarise, organise and communicate the generated knowledge through a report.

ASSESSMENT METHODS

This module is assessed through a Written Coursework (100%).