

Course Title:	Data mining and analysis
Course Code:	CSE521/1
Program:	Master Degree In Computer Engineering
Department:	Computer Engineering
Course coordinator:	Dr. Med fadhel SAAD
Institution:	Private Higher School of Engineers of Gafsa (ESIP)

# A. Course Identification

1. Credit hours:	3 (2-1-0)	
2. Course type		
a. College	Department Others	
b. Fundament	al Transversal Optional	
3. Level/year at whi	ich this course is offered: 3.1/3	
4. Pre-requisites for this course (if any): algorithm and data structure (CSE131), Applied		
probabilities and stati	istics (CSE 112), Data base	

### 1. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Self- study	Total workload
1	Traditional classroom			
2	Blended	30		
3	E-learning		22	52
4	Distance learning			
5	Other ()			

### 2. Contact Hours (based on academic semester)

No	Activity	<b>Contact Hours</b>
1	Lecture	15
2	Laboratory/Studio	15
3	Tutorial	-
4	Others (specify)	-
	Total	30

## **B.** Course Objectives and Learning Outcomes



### **Course Description**

This course introduces students to data mining and pattern analysis, helping them discover hidden patterns, trends, and insights in large datasets. It covers pattern evaluation, classification methods, and clustering techniques that are widely used in real-world applications.

Students will learn how to identify and evaluate patterns, build predictive models, and apply clustering algorithms like K-Means and DBSCAN. Through a mix of theory, hands-on exercises, and case studies, they will develop practical skills to analyze data and extract valuable information.

### **Course Main Objective**

By the end of the course, students will be able to:

- ✓ Understand how to evaluate patterns in data mining and why it matters.
- ✓ Apply pattern-based classification to build predictive models.
- ✓ Use clustering techniques to group and segment data effectively.
- ✓ Learn different clustering methods like K-Means, hierarchical clustering, and DBSCAN, and when to use them.
- ✓ Work on real-world applications like text data mining to uncover meaningful insights.
- ✓ Stay updated on advanced pattern discovery techniques and the latest trends in data mining.

		Aligned
	5	PLOs
1	Knowledge and Understanding	
2.1	$\checkmark$ Understand the fundamentals of pattern evaluation and its role in data mining.	PLO.K2
2.2	✓ Learn the principles and applications of pattern-based classification	
3.1	✓ Understand different clustering methods and their use in data segmentation.	
3.2	✓ Explore real-world applications of pattern mining, including text data analysis.	PLO.K3
3.3	$\checkmark$ Stay updated on emerging trends and advanced concepts in pattern discovery.	
2	Skills	
2.1	<ul> <li>Develop and apply data mining techniques to extract meaningful insights from large datasets.</li> </ul>	PLO.S2
3.1	✓ Build predictive models using pattern-based classification techniques. PLO.S3	
5.1	✓ Use clustering algorithms (K-Means, hierarchical clustering, DBSCAN) to analy and group data.	yze PLO.S5
6.1	6.1 Evaluate and compare different pattern mining and clustering methods for various PLO.S6 applications.	
7.1	7.1✓ Apply data mining and pattern analysis techniques in real-world case studies and projects.PLO.S7	
C.	Course Content	
	No List of Topics	Contact Hours

### 1. Course Learning Outcomes



	Chapter 1: Pattern Evaluation; Mining Diverse Frequent	
	Patterns	
1	1. Introduction to pattern evaluation	5
	2. Frequent pattern mining techniques	-
	3. Diverse frequent pattern mining	
	Chapter 2: Pattern-Based Classification	
	1 Dringinles of classification	
2	Principles of classification     Decision trees and rule based classification	5
	2. Decision need allossification algorithms	
	5. Fattern-based classification algorithmis	
	Chapter 3: Pattern Mining Applications & Advanced	
	1. TopicsText data preprocessing and analysis	
3	2. Mining quality phrases from text data	4.5
	3. Emerging trends in pattern discovery	
	Module 4: Introduction to Cluster Analysis & Similarity	
	Measures	
4	1. Introduction to cluster analysis	
	2. Differentiating between supervised and unsupervised learning	
	3. Similarity measures for clustering	
	Module 5: Partitioning & Hierarchical Clustering Methods	
	1 K-means and hierarchical clustering	
5	<ol> <li>Agolomerative and divisive clustering</li> </ol>	4
	3 Choosing the right clustering method	
	5. Choosing the right clustering method	
	Module 6: Advanced Clustering Methods & Programming	
	Assignment 1	
	1. Advanced hierarchical clustering techniques	
6	2. Density-based clustering (DBSCAN)	
	3. Grid-based clustering (STING)	
	4. Real-world applications of clustering analy	
Total		30

# **D.** Teaching and Assessment



	Assessment Methods		
Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	Knowledge and Understanding		
PLO.K2	<ul> <li>Understand the fundamentals of pattern evaluation and its role in data mining.</li> <li>Learn the principles and applications of pattern-based classification.</li> </ul>	- Class	
PLO.K3	<ul> <li>✓ Understand different clustering methods and their use in data segmentation.</li> <li>✓ Explore real-world applications of pattern mining, including text data analysis.</li> <li>✓ Stay updated on emerging trends and advanced concepts in pattern discovery.</li> </ul>	discussions - Assignments - Projects	Assignments, , Report, exam
2.0	Skills		
PLO.S2	<ul> <li>✓ Develop and apply data mining techniques to extract meaningful insights from large datasets.</li> </ul>		
PLO.S3	<ul> <li>✓ Build predictive models using pattern- based classification techniques.</li> </ul>		
PLO.S5	✓ Use clustering algorithms (K-Means, hierarchical clustering, DBSCAN) to analyze and group data.	- Class discussions - Assignments	Assignments, , Report, exam
PLO.S6	<ul> <li>Evaluate and compare different pattern mining and clustering methods for various applications.</li> </ul>	- Projects	
PLO.S7	<ul> <li>✓ Apply data mining and pattern analysis techniques in real-world case studies and projects.</li> </ul>		

# 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

#### 2. Assessment Tasks for Students

	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Practical Work (written or oral)	Weekly	00 %
2	Quizzes, Homework assignments	Random	00 %
3	First mid Term	-	00 %
4	Final Exam	11	100%

# E. Student Academic Counselling and Support



Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:

1- Office hours

2- Blackboard interface

### F. Learning Resources and Facilities

1. Learning Resources

Required Textbooks	<ol> <li>Han, J., Kamber, M., &amp; Pei, J. (2011). Data mining: Concepts and techniques. Morgan Kaufmann.</li> <li>Tan, P. N., Steinbach, M., &amp; Kumar, V. (2013). Introduction to data mining. Pearson.</li> <li>Witten, I. H., Frank, E., Hall, M. A., &amp; Pal, C. J. (2016). Data mining: Practical machine learning tools and techniques. Morgan Kaufmann.</li> <li>Hastie, T., Tibshirani, R., &amp; Friedman, J. (2009). The elements of statistical learning: Data mining, inference, and prediction. Springer.</li> </ol>
Essential References Materials	
Electronic Materials	<ol> <li>MIT OpenCourseWare (OCW)</li> <li>UCI Machine Learning Repository</li> </ol>
Other Learning Materials	NA

### 3. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	classroom board software
<b>Technology Resources</b> (AV, data show, Smart Board, software, etc.)	data show;

## G. Course Quality Evaluation



<b>Evaluation Areas/Issues</b>	Evaluators	<b>Evaluation Methods</b>	
Effectiveness of teaching and	Students, course coordinator, Alumni,	Direct/Indirect	
assessment.	Employers		
Extent of achievement of course	nent of course Faculty, Program Leaders, quality		
learning outcomes.	department	Direct	
Quality of Learning resources	Faculty, Program Leaders,	Direct, Indirect	
Teaching and learning quality	Studenta Ecculty Program Londorg	Direct Indirect	
and effectiveness.	Students, Faculty Flogram Leaders,	Direct, mullect	

# H. Specification Approval Data

Council / Committee	Computer Engineering Council
Date	11/09/2023