Course Specification
— (Postgraduate)

Course Title: Pattern Recognition

Course Code: 501833-3

Program: Master in Artificial Intelligence

Department: Computer Science

College: Computers and Information Technology

Institution: Taif University

Version: V2
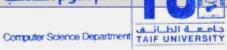
Last Revision Date: 5 May 2024

قسم علوم الحاسب
Computer Science Department

جامعة الطائف
TAIF UNIVERSITY

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A. General information about the course:

1. Course Identification:

1. Credit hours: (3)

2. Course type

A.	☐University	☐College	☒ Department	☐Track	
B.	☐ Required		☒ Elective		

3. Level/year at which this course is offered: (Year: 1, Level: 1)

4. Course general Description:

The course emphasis on different techniques and algorithms for pattern recognition. The representation of patterns and the proximity/similarity measures are an important aspect of pattern recognition. The course discusses feature extraction and selection techniques for several types of data such as images or signal. The two well-known paradigms of machine learning, clustering and classification, are covered in this course. Algorithms from supervised learning are introduced such as nearest neighbor and support vector machines. Clustering is an important aspect of unsupervised learning and has been covered extensively in this course. Combination of classifiers have been dealt with where more than one classifier is used to arrive at a class label. The course also cover method of evaluating the system and how to improve its result. The applications of pattern recognition to a practical problem will be discussed such as fingerprint and documents analysis and recognition. Project is required for this course.

5. Pre-requirements for this course (if any):

None.

6. Co-requirements for this course (if any):

None.

7. Course Main Objective(s):

The course introduces the students to the Pattern Recognition system, its applications, components, and design.

2. Teaching Mode: (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	36	80%
2	E-learning	9	20%
3	Hybrid ▪ Traditional classroom ▪ E-learning	0	0%
4	Distance learning	0	0%

3. Contact Hours: (based on the academic semester)

No	Activity	Contact Hours
1.	**Lectures**	**45**
2.	**Laboratory/Studio**	-
3.	**Field**	-
4.	**Tutorial**	-
5.	**Others (specify): Mid-Term and Final Exams**	-
	Total	**45**

B. Course Learning Outcomes (CLOs), Teaching Strategies and Assessment Methods:

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
1.0	**Knowledge and understanding**			
1.1	Explain different patterns and classification methods.	**K1**	Lecture, Brainstorming, Discussion	**Direct:** Quiz, Exam **Indirect:** Survey
1.2	Associate real world problems that can be solved with appropriate pattern recognition techniques	**K1**	Lecture, Brainstorming, Discussion	**Direct:** Quiz, Exam **Indirect:** Survey
1,3	State the problems that computationally solvable with pattern recognition techniques	**K1**	Lecture, Brainstorming, Discussion	**Direct:** Quiz, Exam **Indirect:** Survey
2.0	**Skills**			
2.1	Design and develop solutions for real world problems using pattern recognition techniques.	**S2**	Lecture, Project, Problem Solving	**Direct:** Exam, Quiz, Project **Indirect:** Survey
2.2	Evaluate the accuracy and performance of the pattern recognition systems using scientific methods.	**S2**	Lecture, Project, Problem Solving	**Direct:** Exam, Quiz, Project **Indirect:** Survey
2.3	Communicate and conceptually criticize available pattern recognition approaches for a given problem.	**S3**	Lecture, Project, Problem Solving	**Direct:** Exam, Quiz, Project **Indirect:** Survey
3.0	**Values, autonomy, and responsibility**			

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
3.1	Function effectively as a member or leader of a team engaged in activities appropriate to the field of pattern recognition.	**V2**	Discussion, Problem Solving	**Direct:** Project, Presentation **Indirect:** Survey
3.2	Demonstrate professional, ethical, legal, security, and social issues and their responsibilities	**V2**	Discussion, Problem Solving	**Direct:** Project, Presentation **Indirect:** Survey

C. Course Content:

No	List of Topics	Contact Hours
1.	Introduction, Definitions, Components PR systems.	3
2.	Data structures for pattern representation, features selection and extraction.	9
3.	Similarity measures and Nearest Neighbor Classifier	6
4.	Bayesian Decision theory and non-metric methods	6
5.	Clustering and Support Vector Machines	6
6.	Post-processing, Optimization, and evaluation	6
7.	Combination of Classifiers	6
Total		**45**

D. Students Assessment Activities:

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Lab and Practical	Weekly	20%
2.	Project demonstration and presentation of applications in image or character recognition	Week 3, 6, 9	20%
4.	Mid-Term Exam	Week 8	20%
5.	Final Exam	Week 16	40%

*Assessment Activities (i.e., Written test, oral test, oral presentation, group project, essay, etc.)

E. Learning Resources and Facilities:

1. References and Learning Resources:

Essential References	▪ Duda, Richard O., Peter E. Hart, and David G. Stork. Pattern classification. 2nd ed. New York, NY: Wiley, 2001. ISBN: 0471056693. ▪ Pattern Recognition and Machine Learning" by Christopher M. Bishop, ISBN-13: 978-0387310732 ▪ Devi V.S.; Murty, M.NPattern Recognition: An Introduction, Universities Press, Hyderabad .(2011), ISBN:978-9814335454
Supportive References	▪ -
Electronic Materials	▪ The world's most trusted open ecosystem for sourcing, building, and deploying data science and AI initiatives: https://www.anaconda.com/ ▪ **MATLAB or Python Programing**
Other Learning Materials	▪ Links provided by the instructor. ▪ Handouts and Presentations Slides prepared by the instructor. ▪ Blackboard.

2. Educational and Research Facilities and Equipment Required:

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	▪ Classroom (20 students/class) ▪ Computer labs
Technology equipment (Projector, smart board, software)	▪ Video projector / data show ▪ White board
Other equipment (Depending on the nature of the specialty)	▪ To be announced during the course!

F. Assessment of Course Quality:

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	Students Coordinator	Indirect (Course exit survey) Indirect (Feedback from Course Coordinator)
Effectiveness of students assessment	Faculty member Coordinator	Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator)
Quality of learning resources	Students Faculty member Coordinator Council Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member) Indirect (Feedback from Course Coordinator) Indirect (Feedback from council) Indirect (Feedback from Graduate Committees)

Assessment Areas/Issues	Assessor	Assessment Methods
The extent to which CLOs have been achieved	Students Faculty member Coordinator Curriculum Committees	Indirect (Course exit survey) Indirect (Feedback from Faculty member/ Course Coordinator/ Graduate Committee)
Other	-	-

Assessor (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

Assessment Methods (Direct, Indirect)

G. Specification Approval Data:

COUNCIL /COMMITTEE	GRADUATE PROGRAMS COMMITTEE – CS DEPT.
REFERENCE NO.	V2
DATE	5/5/2024

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