اعتماد
NCAAA

T4

2020

Course Specifications

Course Title:	Pattern Recognition
Course Code:	501583-3
Program:	Bachelor in Computer Science
Department:	Department of Computer Science
College:	College of Computers and Information Technology
Institution:	Taif University

Table of Contents

A. Course Identification

1. Credit hours:3

2. Course type

a.	University ☐	College ☐	Department **X**	Others ☐
b.		Required ☐	Elective **X**	

3. Level/year at which this course is offered: 15th level

4. Pre-requisites for this course (if any)**: 502372-3**

5. Co-requisites for this course (if any)**: None**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	**Traditional classroom**	4	80%
2	**Blended**		
3	**E-learning**	1	20%
4	**Distance learning**		
5	**Other**		

7. Contact Hours (based on academic semester)

No	Activity	Contact Hours
1	**Lecture**	50
2	**Laboratory/Studio**	
3	**Tutorial**	
4	**Others** (specify)	
	Total	50

B. Course Objectives and Learning Outcomes

1. Course Description

This course introduces students to basic pattern recognition theories and methodologies. Topics include: introduction to pattern recognition, Bayesian decision theory, parametric and non-parametric methods, feature extraction, selection and reduction, classifiers, unsupervised learning and clustering. Applications of the mentioned topics for solving real-world problems will be introduced using appropriate programming algorithms.

2. Course Main Objective

At the end of this course, students will be able to:
- understand different concepts and approaches of pattern recognition.
- understand different methods of feature extraction, feature selection and reduction.
- apply supervised and unsupervised classification methods used in a pattern recognition system.

3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge and Understanding**	
1.1	Describe basic concepts and approaches of pattern recognition and machine intelligence algorithms	K1
1.2	Describe the basic methods of feature extraction, feature reduction and evaluation.	K1
1.3	Explain both supervised and unsupervised pattern recognition methods to detect and characterize patterns in real-world data	K1
2	**Skills :**	
2.1	Apply pattern recognition techniques in real-world problems	S1
3	**Values:**	
3.1		
3.2		

C. Course Content

No	List of Topics	Contact Hours
1	Introduction – Pattern Recognition system and basic concept	6
2	Overview of statistics, random vectors and linear algebra	3
3	Bayesian Decision Theory	6
4	Parametric and Non-parametric methods	6
5	Feature extraction, selection, reduction (Principle Component Analysis)	6
	Midterm exam	1
6	Dimensionality reduction (Linear Discriminant Analysis)	3
7	Supervised classification algorithms (kNN, SVM)	6
8	Neural Networks and Backpropagation	3
9	Applications of real-world classification problems	2
10	Unsupervised clustering algorithms	6
11	Applications of real-world clustering problems	2
	Total	50

D. Teaching and Assessment

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

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.0	**Knowledge and Understanding**		
1.1	Describe basic concepts and approaches of pattern recognition and machine intelligence algorithms	Lectures	**Direct** Homework/Project Exams **Indirect** Course Exit Survey
1.2	Describe the basic methods of feature extraction, feature reduction and evaluation	Lectures	**Direct** Homework/Project Exams **Indirect** Course Exit Survey

Code	Course Learning Outcomes	Teaching Strategies	Assessment Methods
1.3	Explain both supervised and unsupervised pattern recognition methods to detect and characterize patterns in real-world data	Lectures	**Direct** Homework/Project Exams **Indirect** Course Exit Survey
2.0	**Skills**		
2.1	Apply pattern recognition techniques in practical problems	Lectures Homework Project	**Direct** Homework/Project Exams **Indirect** Course Exit Survey
3.0	**Values**		
3.1			
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	Home Works and Project	Week 3 →10	40%
2	Midterm Exam	Week 5	20%
3	Final Exam	Week 11	40%

*Assessment task (i.e., written test, oral test, oral presentation, group project, essay, etc.)

E. Student Academic Counseling and Support

Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :
- Meeting in pre-determined office hours
- Consultation by appointment (as needed)
- Through emails
- Through Blackboard

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	*Pattern Classification,* Authors-Richard O. Duda, Peter E. Hart, and David G.Stork, Publisher-Wiley-Inderscience, ISBN10-0471056693, Edition-2nd, Publication Year-2000
Essential References Materials	*Pattern Recognition and Machine Learning* by Christopher Bishop Publisher: Springer Science, Edition 2006, ISBN-10: 0387310738
Electronic Materials	- TBA during the course
Other Learning Materials	- TBA during the course

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	• Classroom with 20-30 chairs
Technology Resources (AV, data show, Smart Board, software, etc.)	• Video projector / data show • White board
Other Resources (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	TBA during the course

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Effectiveness of Teaching	• Students	Students surveys and Students course evaluation •
Improvement of Teaching	Course Coordinator	• Deficiencies based on the student Evaluation, faculty input, course file, and program assessment
Verifying Standards of Student Achievement	• Curriculum Committee	● Review CAF (Course assessment file) ● Alumni surveys. Periodic exchange and remarking of tests or a sample of assignments with staff at another

Evaluation areas (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)
Evaluators (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)
Assessment Methods (Direct, Indirect)

H. Specification Approval Data

Council / Committee	CS council
Reference No.	Meeting #12
Date	23-10-1443