Course Specifications

Course Title:	Pattern Recognition
Course Code:	AI 327
Program:	Information and Computer Science
Department:	Computer Science and Information
College:	College of Science AL Zulfi
Institution:	Al Majmaah University

Table of Contents

A. Course Identification

1. **Credit hours:**
2. **Course type**   **a.** University ☐ College ☐ Department ☐ Others ☐   **b.** Required ☐ Elective ■
3. **Level/year at which this course is offered:**
4. **Pre-requisites for this course** (if any)**:**   Artificial Intelligence – AI 327
5. **Co-requisites for this course** (if any)**:**

6. Mode of Instruction (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	48	80 %
2	Blended	6	10 %
3	E-learning	6	10 %
4	Correspondence		
5	Other		

7. Actual Learning Hours (based on academic semester)

No	Activity	Learning Hours
Contact Hours		
1	Lecture	30
2	Laboratory/Studio	20
3	Tutorial	10
4	Others (specify)	
	Total	60
Other Learning Hours*		
1	Study	30
2	Assignments	30
3	Library	20
4	Projects/Research Essays/Theses	
5	Others (specify)	20
	Total	100

* The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

B. Course Objectives and Learning Outcomes

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1. Course Description

Pattern recognition techniques are used to design automated systems that improve their own performance through experience. This course covers the methodologies, technologies, and algorithms of statistical pattern recognition from a variety of perspectives. Topics including Bayesian Decision Theory, Estimation Theory, Linear Discrimination Functions, Nonparametric Techniques, Support Vector Machines, Neural Networks, Decision Trees, and Clustering Algorithms etc. will be presented.

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2. Course Main Objective

After completing this course, the students should be able to:
1. Understand basic concepts in pattern recognition
2. Gain knowledge about state-of-the-art algorithms used in pattern recognition research
3. Understand pattern recognition theories, such as Bayes classifier, linear discriminant analysis.
4. Apply pattern recognition techniques in practical problems.

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3. Course Learning Outcomes

	CLOs	Aligned PLOs
1	**Knowledge:**	
1.1	knowledge of advanced techniques to the design of and computer engineering systems	K3-AI
1.2	Ability to learn new subjects that are required to solve problems in industry without being dependent on a classroom environment.	
1.3		
1...		
2	**Skills :**	
2.1	Ability to apply the appropriate industry practices, emerging technologies, state-of-the-are design techniques, software tools	**S3- AI**
2.2	ability to use the appropriate state-of-the art engineering references and resources, including IEEE research journals and industry publications, needed to find the best solutions to electrical and computer engineering problems.	
2.3		
2...		
3	**Competence:**	
3.1	Ability to communicate clearly and use the appropriate medium, including written, oral, and electronic communication methods.	**C3-AI**
3.2		
3.3		
3...		

C. Course Content

No	List of Topics	Contact Hours
1	Bayesian Decision Theory	4
2	Estimation Theory	8
3	EM algorithms and HMM	8

4	Nonparametric Techniques	8
5	Linear Discriminant Functions	8
6	Support vector Machine	8
7	Neural Networks	4
8	Stochastic Learning	4
10	Algorithm Independent Learning	4
11	Unsupervised Learning	4
Total		60

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**		
1.1	knowledge of advanced techniques to the design of and computer engineering systems	Lectures, Lab demonstrations Case studies Individual presentations	Written Exam Homework assignments Class & lab Activities Quizzes
1.2	Ability to learn new subjects that are required to solve problems in industry without being dependent on a classroom environment.		
…			
2.0	**Skills**		
2.1	Ability to apply the appropriate industry practices, emerging technologies, state-of-the-are design techniques, software tools	Group discussions, Lab demonstrations, Brainstorming Presentations	Home works and assignments
2.2	ability to use the appropriate state-of-the art engineering references and resources, including IEEE research journals and industry publications, needed to find the best solutions to electrical and computer engineering problems.		
…			
3.0	**Competence**		
3.1	Ability to communicate clearly and use the appropriate medium, including written, oral, and electronic communication methods.	Group discussions, Case Studies, Brainstorming Presentations	Written Exam Homework assignments Class & lab Activities Quizzes
3.2			
…			

2. Assessment Tasks for Students

#	Assessment task*	Week Due	Percentage of Total Assessment Score
1	First written mid-term exam	6	10%
2	Second written mid-term exam	12	10%
3	Presentation, class activities, and group discussion	Every week	10%
4	Homework assignments	After Every chapter	10%
5	Practical exam	15	20%
6	Final exam	16	40%
7	Total		100%
8			

***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 :

F. Learning Resources and Facilities

1.Learning Resources

Required Textbooks	*Machine Learning: The Art and Science of Algorithms, Peter Flach, CAMBRIDGE UNIVERSITY PRESS 2019*
Essential References Materials	*Markov Models for Pattern Recognition*, Gernot A. Fink, Springer 2010
Electronic Materials	
Other Learning Materials	

2. Facilities Required

Item	Resources
Accommodation (Classrooms, laboratories, demonstration rooms/labs, etc.)	Classrooms and Laboratories are available at the college of science at Al-Zulfi.
Technology Resources (AV, data show, Smart Board, software, etc.)	Smart Boards, software, data shows and AV technological resources are available.
Other Resources	N/A

Item	Resources
(Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list)	

G. Course Quality Evaluation

Evaluation Areas/Issues	Evaluators	Evaluation Methods
Student-faculty management meetings.	Program Leaders	Direct
Discussion within the staff members teaching the course	Peer Reviewer	Direct
Departmental internal review of the course.	Peer Reviewer	Direct
Reviewing the final exam questions and a sample of the answers of the students by others.	Peer Reviewer	Direct
Visiting the other institutions that introduce the same course one time per semester.	Faculty	Indirect

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	
Reference No.	
Date	