Course Specification

— (Bachelor)

Course Title: Neural Networks	
Course Code: 501582-3	
Program: Bachelor of Computer Science	
Department: Department of Computer Science	
College: College of Computers and Information Technology	
Institution: Taif University	
Version: 1	
Last Revision Date: 2024	

Table of Contents

A. General information about the course:

1. Course Identification

1. Credit hours: (3)

2. Course type

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

3. Level/year at which this course is offered: (9TH)

4. Course general Description:

This is an introductory course to artificial neural networks (ANNs). Topics cover network abilities to cluster, associate, and classify patterns. Investigating these abilities entails studying different network models such as Kohonen, Associative, and Back-Propagation. Different learning techniques such as supervised and unsupervised methods are concurrently introduced. The course concludes with practical considerations in applying neural networks in different Machine Learning applications.

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

501481-3 Artificial Intelligence

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

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7. Course Main Objective(s):

● Introduce the main fundamental concepts and techniques of artificial neural network models.

● Investigate the main artificial neural network models and their applications

2. Teaching mode (mark all that apply)

No	Mode of Instruction	Contact Hours	Percentage
1	Traditional classroom	-	-
2	E-learning	-	-
3	Hybrid ● Traditional classroom ● E-learning	2 1	67% 33%

No	Mode of Instruction	Contact Hours	Percentage
4	Distance learning	-	-

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)**	
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	Describe the analogy between biological and artificial models	**K1**	Lectures	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
1.2	Describe different learning techniques such as supervised and unsupervised methods	**K1**	Lectures	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
1.3				
2.0	**Skills**			
2.1	Demonstrate network abilities to cluster, associate, and classify patterns	**S1**	Lectures Homework	**Direct Assessment Tool**

Code	Course Learning Outcomes	Code of CLOs aligned with program	Teaching Strategies	Assessment Methods
			Project	Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
2.2	Evaluate practical considerations in applying neural networks in different applications	**S2**	Lectures Homework Project	**Direct Assessment Tool** Quizzes / Homework/Project/ Exams **Indirect Assessment Tool** Course Exit Survey
3.0	**Values, autonomy, and responsibility**			
3.1				
3.2				

C. Course Content

No	List of Topics	Contact Hours
1.	The analogy between the biological and artificial models	3
2.	The Perceptron	3
3.	The Linear Separability Concept	3
4.	Single- Layer and Multi-Layer Networks	5
5.	Learning techniques (e.g., Supervised and unsupervised)	3
6.	Pattern association using associative memory networks (Auto & Hetero, BAM)	3
7.	Pattern Clustering (Kohonen SOM and learning Vector Quantization Networks)	5
8.	Pattern classification using Back-Propagation Networks	4
9.	Introduction to important components of Neural Networks: Loss function, Optimization, and Generalization.	3
10.	Introduction to Deep Learning	3
11.	Pattern Classification using Deep Learning	5
12.	Pattern Classification using Convolutional Neural Networks (CNNs)	5
Total		**45**

D. Students Assessment Activities

No	Assessment Activities *	Assessment timing (in week no)	Percentage of Total Assessment Score
1.	Student Participation/Attendance	EveryWeek	5%
2.	Project/Homework	Week 3 -14	15%
3.	Quizzes	Week 4 &12	10%
4.	Midterm Exam	Week 8	20%
5.	Final Exam	Week 16	50%

*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	• Introduction to Artificial Neural Networks, Sivanandam & Paulraj, VIKAS Publishing House, 2013
Supportive References	• Neural Networks and Learning Machine, Simon Haykin, Pearson Education, 2009
Electronic Materials	-
Other Learning Materials	-

2. Required Facilities and equipment

Items	Resources
facilities (Classrooms, laboratories, exhibition rooms, simulation rooms, etc.)	• A Lecture room appropriate for maximum 30 students with a personal computer, a data show and a smart board.
Technology equipment (projector, smart board, software)	• Video projector / data show
Other equipment (depending on the nature of the specialty)	

F. Assessment of Course Quality

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of teaching	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees

Assessment Areas/Issues	Assessor	Assessment Methods
Effectiveness of Students assessment	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
Quality of learning resources	• Students • Faculty members • Coordinator • Council Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
The extent to which CLOs have been achieved	• Students • Faculty members • Coordinator • Council • Curriculum Committees	• Course exit survey • Feedback from Faculty members • Feedback from Course Coordinator • Feedback from council • Feedback from Curriculum Committees
Other		

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

Assessment Methods (Direct, Indirect)

G. Specification Approval

COUNCIL /COMMITTEE	CS council
REFERENCE NO.	Meeting #11
DATE	07/03/2024