

CEN 426

Neural Network and Fuzzy Logic

Term 2 - 2014

Course Profile

All details in this course profile for CEN426 have been officially approved by College of Computer and Information Science, Majmaah University. The information will not be change unless absolutely necessary and any change will be clearly indicated by an approved correction included in the profile.

General Information

OVERVIEW

This course introduces to undergraduate students the fundamentals, computing, design, and application of Artificial Neural Network (ANN).

Types of ANN based on input layer, hidden layer and output layer.

The classification of the ANNs based on their application.

The basics of Fuzzy Logic (FL) such as fuzzy set, membership function, fuzzification and defuzzification.

The design of fuzzy logic and a fuzzy controller model.

The explanation of different FL model types and their applications.

The fundamentals of computing, design, and application of Neuro-Fuzzy system.

The comparison between neuro-fuzzy and ANN system

DETAILS

Level	10
Credit Points	3(2,2,0)

PRE-REQUISITES OR CO-REQUISITES

Pre-requisite: CEN 323

ATTENDANCE REQUIRMENTS

Absences are counted from the first day of the semester. The student must regularly attend all lectures and practical lessons. The student will not be allowed to participate in the final examinations if his percentage of attendance is less than (75%) of the lectures and practical lessons allotted for the course.

ASSESSMENT OVERVIEW

Assessment Task	Weighting
1. Midterm Exam-1	15%
2. Midterm Exam-2	15%
3. Lab Projects	20%
4. Assignments	10%
5. Final Exam	40%

This is a graded course: your overall grade will be calculated from the marks or grades for each assessment task, based on the relative weightings shown in the table above. You must obtain an overall mark for the course of at least 60%, or an overall grade of 'pass' in order to pass the course.

Policies

Homework

Four homework will be assigned throughout the semester. Homework will be due at the beginning of exercise session one week after posting it, and each student is responsible for submitting his homework to the instructor in his office or in the exercise session. The student must turn in his own homework using his own words. Homework solution will be posted one week after the due date.

Late Submission of Assignments

Penalty for late submission - 10% of the maximum mark specified for the assessment will be deducted for each working day.

Assessment documents submitted beyond a period of one week after the last date of submission will not be accepted and will be marked as zero for that assessment.

Plagiarism Policy

Plagiarized documents, in parts or whole, submitted by the students will be rejected. However, if the work submitted is found to be intentionally plagiarized to gain an unfair advantage in any form, such work will be automatically rejected and a mark of zero will be awarded. If the student is found to consistently submit plagiarized work it will be referred to the College Council.

Policy on Cheating

Cheating includes but is not limited to any attempt to gain an unfair advantage in an assessment (including examinations), or assisting another student to do so. It includes: taking unauthorized materials into examinations, copying from other candidates, collusion, impersonation, plagiarism, and unauthorized access to unseen examination papers.

The minimum penalty for a proven case of academic dishonesty is usually a mark of zero in that assessment, with the maximum being appropriate action by the College Council.

Re-Marking Examination Answer Sheets

Restrictions of Re-Marking Examination Answer Sheets:

1. The student may apply to the department that presents the course to re-mark his answer sheet which will be referred to the college council within a maximum of one month after the end of the final examination.
2. The student may not apply for a request to re-mark his answer sheet beforehand, as his request will be invalid.
3. The student must not apply for re-marking the answer sheets for more than one single course during one semester.
4. A written form is filled out including the items 1,2,3 stated above in addition to: student's name, I.D. number, course number, course code, course name, the semester, absence rate, accumulative average, warnings, instructor's name, examination date, reason(s) for re-marking request and a pledge from the student regarding the accuracy of information submitted in the form.

5. In case of approval, the College Council constitutes a committee including at least three staff members who will re-mark the answer sheet(s) and present a report to the college council who will give a final decision.

Excuse of not Attending the Examination

The rules of acceptance or rejection student's excuse of not attending the examination in Computer and Information Sciences at Majmaah University:

1. The student can present his crucial excuse of not attending the midterm examination to the department chair by filling out Midterm Examination Absence Form.
2. The student can present his crucial excuse of not attending the final examination to the college dean by filling out Final Examination Absence Form.
3. The excuse must be issued by governmental medical clinic/agency.
4. The excuse must be submitted by the student or his official representative within one week of its occurrence. All supported document should be included with correspondence absence form.
5. The department council has the authority of acceptance or rejection student's excuse of not attending the midterm examination taking into consideration the recommendation of course instructor. Copy of department council decree should be sent to Dean of the college, Examination Unit, and student's academic advisor.
6. The college council has the authority of acceptance or rejection student's excuse of not attending the final examination taking into consideration the recommendation of course instructor, and department chairman. Copy of department council decree should be sent to Examination Unit, and student's academic advisor.
7. The examinations unit is responsible for announcing the names of the students whose excuse have been accepted or rejected. The unit arranges date and time of alternative exam and its mechanism in accordance with instructors and departments' chairmen in the college.
- 8.

Course Learning Outcomes

The student is expected to be able to:

1. Understand the concept of ANN, FL, and Neuro-fuzzy.

2. Be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of data.
3. Understand the distinction between the applications of ANN, FL, and Neuro-fuzzy systems.
4. Understand the distinction between the advantages and disadvantages of ANN, FL, and Neuro-fuzzy systems.

ALIGNMENT OF ASSESSMENT TASKS TO LEARNING OUTCOMES

Assessment Task	1	2	3	4
1. Midterm Exam-1	x	x		
2. Midterm Exam-2	x	x	x	
3. Lab	x	x	x	x
4. Assignments/Report/Seminar	x	x	x	x
5. Final Exam	x	x	x	x

Textbook and Resources

PRESCRIBED TEXTBOOKS

1- Control and Dynamic Systems (Neural Network Systems Techniques and Applications)			
Author/s	Cornelius T. Leondes	Year	1997
Edition		Publisher	Academic Press
2- Fuzzy Logic with Engineering Applications			
Author/s	Timothy Ross	Year	2010
Edition	3rd Edition	Publisher	Wiley

IT RESOURCES

You will need access to the following IT resources:

- MU University Student Email
- Internet
- Course Website
- Matlab

Referencing style

All submissions for this course must use the **American Psychological Association (APA)** referencing style. For further information, see the Assessment Tasks below.

Teaching Contacts

Course Coordinator:	Eyad Haj Said
Lab/Tutorial Instructor:	Yazan Otoum
Email:	eh.said@mu.edu.sa , y.otoum@mu.edu.sa
Office Hours:	Sun: 9:00am – 12:00pm, or by appointment
Office Number:	16 4042597

Schedule

Week	Module/Topic	Chapter	Event and submission
Week 1	Introduction to Fuzzy Logic Systems	Chapter 1-2	
Week 2-3	Basic Concepts in Fuzzy Logic : fuzzy set, membership function, Fuzzy relations	Chapter 3-4	Assignment 1
Week 4-5	Fuzzification and Defuzzification.	Chapter 4	
Week 6-7	Designing of Fuzzy System Controller and FL models	Chapter 5	Midterm-1 (Week-7) Assignment 2
Week 8	Introduction to Neural Networks and its Applications		
Week 9-10	Basic learning algorithms: delta learning rule, the back propagation algorithm, self-organization learning		Assignment 3
Week 11-12	Multilayer neural networks and back-propagation		Assignment 4
Week 13-14	Self-organizing neural		Midterm-2 (Week 13)

	networks		
Week 15	Neuro-Fuzzy systems		
Week 16			Final Exam

Assessment Task

WRITTEN ASSESMENT: Midterm Exam-1

Assessment Title	Midterm Exam-1
Task Description	<p>This assignment is aligned to learning outcomes 1, 2 and 3. In that regard, the assignment contains questions that assess:</p> <ol style="list-style-type: none"> 1. Understanding the concept of ANN, FL, and Neuro-fuzzy. 2. To be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of data.
Assessment Due Date	Week 8
Return Date to Students	Week 9
Weighting	15%
Assessment Criteria	The assessment criteria for this task are under continuous revision.
Referencing Style	American Psychological Association (APA)
Submission	Online Submission instructions are provided in Moodle.
Learning Outcomes Assessed	<ol style="list-style-type: none"> 1. Understanding the concept of ANN, FL, and Neuro-fuzzy. 2. To be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of data.

WRITTEN ASSESMENT: Midterm Exam-2

Assessment Title	Midterm Exam-2
Task Description	<p>This assignment is aligned to learning outcomes 4, 5 and 6. In that regard, the assignment contains questions that assess:</p> <ol style="list-style-type: none"> 1. Understanding the concept of ANN, FL, and Neuro-fuzzy. 2. To be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of

	<p>data.</p> <p>3. The distinction between the applications of ANN, FL, and Neuro-fuzzy systems..</p>
Assessment Due Date	Week 13
Return Date to Students	Week 14
Weighting	15%
Assessment Criteria	The assessment criteria for this task are under continuous revision.
Referencing Style	American Psychological Association (APA)
Submission	Online Submission instructions are provided in Moodle.
Learning Outcomes Assessed	<ol style="list-style-type: none"> 1. Understanding the concept of ANN, FL, and Neuro-fuzzy. 2. To be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of data. 3. The distinction between the applications of ANN, FL, and Neuro-fuzzy systems.

EXAMINATION: Final Exam

Outline	Complete an examination
Date	During University examination period
Weighting	40%
Length	180 Minutes
Details	<p>Dictionary - non-electronic, concise, direct translation only (dictionary must not contain any notes or comments)</p> <p>Calculator Permitted, Closed Books</p>
Learning Outcomes Assessed	<ol style="list-style-type: none"> 1. Understanding the concept of ANN, FL, and Neuro-fuzzy. 2. To be familiar with modeling ANN, FL, and Neuro-fuzzy systems using different types of data. 3. The distinction between the applications of ANN, FL, and Neuro-fuzzy systems. 4. The distinction between the advantages and disadvantages of ANN, FL, and Neuro-fuzzy systems.