MSc program, Biomedical Engineering Department

Course Unit Title	Advance Artificial Neural Networks
Course Unit Code	BME580
Type of Course Unit	Elective
Level of Course Unit	MSc program
National Credits	3
Number of ECTS Credits Allocated	10
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	-
Semester when the course unit is delivered	-
Course Coordinator	Assist. Prof. Dr. Elbruz Imanov
Name of Lecturer (s)	Assist. Prof. Dr. Kamil Dimililer
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	-
Recommended Optional Programme Components	Computer programming skills

Course description:

This course explores the organization of synaptic connectivity as the basis of neural computation and learning. Perceptron and dynamical theories of recurrent networks including amplifiers, attractors, and hybrid computation are covered. Additional topics include back propagation and Hebbian learning, as well as models of perception, motor control, memory, and neural development.

Objectives of the Course:

- To give the students an opportunity to study and learn some concepts of Artificial Neural Networks
- To gain an appreciation of the principal components of Computational Intelligence
- To evaluate and implement Neural Networks for solving synthetic and real-world problems

Learning Outcomes

	After completing the course the student will be able to	Assessment
1	Explain the principles underlying Neural Networks	1
2	Understand the theoretical foundation of Neural Networks	1
3	Apply Neural Networks to find solutions to complex problems	1
4	Analyze parameter choices in the use of Neural Networks	1
5	Summarize current research in Neural Networks	1

Assessment Methods: 1. Written Exam, 2. Assignment, 3. Project/Report, 4. Presentation, 5. Lab. Work

Course's Contribution to Program

		CL
1	Apply the rules of scientific research and ethics	5
2	Discuss complex biomedical engineering issues as well as own research results comprehensively and in the context of current international research and present these in writing and orally	4
3	Solve problems by systems analytical thinking both in subject specific and interdisciplinary concepts	5
4	Combine specialized knowledge of various component disciplines	4
5	Carry out in dependent scientific work and organize (capacity of teamwork), Conduct and lead more complex projects	5
6	To assess the social and environment-related effects of their actions	5

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Topics	Exam
1	Introduction to Neural Networks	
2	Neural Computing	
3	Biological Neuron	
4	Definition of ANN	
5	Intelligent Computing	
6	Intelligent Computing	
7		Midterm
8	Traditional vs Neural Computing	
9	Hebbian Rule	
10	Classification on ANN	
11	Parameters of ANN	
12	XOR Problem	
13	Adaline Networks	
14	Recurrent Networks	
15	Hopfield Networks	
16		Final

Recommended Sources

1. Simon Haykin, Neural Networks, 1994.
2. Tom M. Mitchell, Machine Learning, 1997

Assessment

Attendance/participation	10%	Less than 25% class attendance results in NA grade
Midterm Exam	40%	Written Exam
Final Exam	50%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies

1. Attendance to the course is mandatory.
2. Students may use calculators during the exam.
3. Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	-	-	-
Assignment	-	-	-
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	30	30
Final Examination	1	30	30
Self Study	14	8	112
Total Workload			236
Total Workload/25(h)			9.54
ECTS Credit of the Course			10