

School of Engineering and Natural Sciences / Industrial Engineering (English)

2022 - 2023 Academic Year

ARTIFICIAL NEURAL NETWORKS

Syllabus

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
ARTIFICIAL NEURAL NETWORKS	IND3168050	Fall Semester	3+0	3	6
Prerequisites Courses	PROGRAMLAMAYA GİRİŞ; LİNEER CEBİR VE DİFERANSİYEL DENKLEMLER; LİNEER CEBİR; DİFERANSİYEL DENKLEMLER				
Recommended Elective Courses					
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Assist.Prof. Mehmet KOCATÜRK				
Name of Lecturer(s)	Assist.Prof. Mehmet KOCATÜRK				
Assistant(s)					
Aim	The aim of the course is to evaluate the use of the computational models of the neurons in machine learning and the modeling of the components of the nervous system.				
Course Content	This course contains; The Nervous System: Microscopic View,The Nervous System: Macroscopic View,Machine Learning,Perceptron,Multilayer Perceptron,Supervised Learning,Backpropogation Algorithm,Online Learning,Batch Learning,Overfitting,Neural Networks for Pattern Classification,Neural Networks in Regression,Neuromodulation,Reinforcement Learning.				
Course Learning Outcomes		Teaching Methods		Assessment Methods	
Designs single layer perceptron.		1, 10, 14, 16, 2, 22, 3, 4, 6, 9		A, C, D	
Implement online learning algorithm and evaluates the learning performance of the algorithm.		1, 10, 14, 16, 2, 22, 3, 4, 6, 9		A, C, D	
Develops classifiers using multilayer perceptrons.		1, 10, 14, 16, 2, 22, 3, 4, 6, 9		A, C, D	
Designs multilayer perceptron for regression.		1, 10, 14, 16, 2, 22, 3, 4, 6, 9		A, C, D	
Teaching Methods	1: Lecture, 10: Brainstorming, 14: Self-Study, 16: Project Based Learning, 2: Question - Answer, 22: -, 3: Discussion, 4: Exercise, Practice, 6: Role Model, Making an example, 9: Simulation				
Assessment Methods	A: Written Exam, C: Homework, D: Project / Design				
Lecture Schedule					
Sequence	Topics	Preliminary Preparation			
1	The Nervous System: Microscopic View				
2	The Nervous System: Macroscopic View				
3	Machine Learning				
4	Perceptron				
5	Multilayer Perceptron				
6	Supervised Learning				
7	Backpropogation Algorithm				
8	Online Learning				
9	Batch Learning				
10	Overfitting				
11	Neural Networks for Pattern Classification				
12	Neural Networks in Regression				
13	Neuromodulation				
14	Reinforcement Learning				
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Alpaydin, E., (2010) Introduction to machine learning, MIT Press,Cambridge. Kandel, E. R., Schwartz, J. H., Jessell, T. M., Siegelbaum, S. A., Hudspeth, A. J. , (2012) Principles of neural science, McGraw-Hill, New York. Lytton, W. W., (2002) From computer to brain : foundations of computational neuroscience, Springer, New York. Dayan, P., Abbott, L. F., (2001) Theoretical neuroscience: Computational and mathematical modeling of neural systems, MIT Press, Cambridge. Izhikevich, E.M., (2007) Dynamical systems in neuroscience: The geometry of excitability and bursting, MIT Press, Cambridge.