AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Machine Learning For Engineers								
Course Code	MCE503		Couse Level	Second Cycle (Master's Degree)					
ECTS Credit	8	Workload	200 *(Hours)*	Theory	3	Practice	0	Laboratory	0
Objectives of the Course	The main objective of this course is to enable the students to design and implement inductive learning systems from an engineering perspective. To this end, the course gives an overview of many concepts, techniques, and algorithms in machine learning, such as inductive versus deductive reasoning, knowledge representation, classification, information gain, feature selection, supervised and unsupervised learning, overfitting and underfitting, cross validation, perceptrons, support vector machines, decision trees, nearest-neighbor algorithms, and Bayesian networks. For practical purposes the course will also get students acquainted with machine learning libraries such as Weka and Mahout.								
Course Content	The topics to be covered are the following: • Introduction to learning theories and machine learning • Inductive versus deductive learning • Knowledge representation • Types of inductive learning • Supervised versus unsupervised learning • Overfitting and underfitting • Cross validation • Learning with decision trees • Information gain • Learning with support vector machines • Learning with Naïve Bayes • Learning with perceptrons • Learning with kNN algorithms • Evaluating learning performances • Kappa statistics • Feature selection • Deep learning								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Experiment, Demonstration, Discussion, Case Study, Project Based Study, Individual Study, Problem Solving								
Name of Lecturer(s)									

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	20
Final Examination	1	40
Quiz	2	10
Assignment	1	30

Recommended or Required Reading	
1	Tom Mitchell. Machine Learning. McGraw-Hill, 1997.
2	Stuart Russell and Peter Norvig. Artificial Intelligence: A Modern Approach. Prentice Hall, 2003.
3	Ethem Alpaydın. Introduction to Machine Learning. The MIT Press, 2004, 2010.
4	Ethem Alpaydın. Yapay Öğrenme. Boğaziçi Üniversitesi Yayınevi, 2011, 2013.

Week	Weekly Detailed Course Contents	
1	Theoretical	Introduction to learning theories and machine learning.
2	Theoretical	Inductive and deductive learning.
3	Theoretical	Knowledge representation and model selection.
4	Theoretical	Supervised learning.
5	Theoretical	Decision trees.
6	Theoretical	Information gain and feature selection.
7	Theoretical	Cross-validation, boosting, pruning, overfitting, undefitting.
8	Intermediate Exam	Midterm Exam
9	Theoretical	Perceptrons.

10	Theoretical	Support vector machines.
11	Theoretical	Nearest-neighbor algorithms.
12	Theoretical	Naïve-Bayes algorithms.
13	Theoretical	Unsupervised learning: clustering.
14	Theoretical	Evaluating experimental results.
15	Theoretical	Deep learning.
16	Final Exam	Final Exam

Workload Calculation

Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	0	3	42
Assignment	5	10	2	60
Term Project	1	15	7	22
Quiz	4	5	0.5	22
Midterm Examination	1	20	2	22
Final Examination	1	30	2	32
			Total Workload (Hours)	200
			[Total Workload (Hours) / 25*] = **ECTS**	8

**25 hour workload is accepted as 1 ECTS*

Learning Outcomes

1	Have a good understanding of fundamental notions of inductive learning from data: data, hypothesis space, search space complexity, information gain, feature selection, learning algorithms, etc.,
2	Comparatively evaluate learning algorithms,
3	Know how to collect, trim, and annotate data
4	Understand how to apply learning algorithms to data
5	Know how to evaluate the results of machine learning experiments

Programme Outcomes *(Civil Engineering Master)*

1	To be able to develop expertise knowledge in a Civil engineering area founded on their graduate competence.
2	To be able to use the theoretical and practical expertise knowledge gained in their specialty area.
3	To be able to use the information, problem solving and / or practical skills from the field, in interdisciplinary studies.
4	To be able to create new knowledge by integrating their knowledge area with the knowledge coming from different disciplines; and solve problems that need expertise by using scientific research methods
5	To be able to solve the problems related to his/her area by using appropriate research methods
6	To be able to devise a problem in their specialty area, develop a solution methodology, solve the problem, and interpret the results and take action if necessary
7	To be able to criticize the knowledge in their specialty area, guide the learning process, and independently direct high level studies
8	To be able to systematically communicate the recent developments in their specialty area and their own studies to groups both inside and outside their specialty area, orally, in writing and visually
9	To be able to use computer software at a level required by their specialty area with drawing upon information and communication technology at a high level
10	To be able to introduce scientific, technological, social and cultural advancements in the field of civil engineering and to contribute to the process of being an information of the society and to sustain it.
11	To be conscious of professional and ethical responsibility and contribute to the establishment of this consciousness.
12	To be able to protect social, scientific, and ethical values during collection, interpretation, and dissemination stages of the data associated with their specialty area; instruct and supervise these values
13	To be able to use at least one foreign language in a level to follow current developments related to the field.

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5
P1	5	5	5	5	4
P2	4	4	4	4	5
P3	5	5	5	5	4
P4	4	4	4	4	5
P5	5	5	5	5	4

P6	4	4	4	4	5
P7	5	5	5	5	4
P8	4	4	4	4	5
P9	5	5	5	5	4
P10	4	4	4	4	5
P11	5	5	5	5	4
P12	4	4	4	4	5
P13	5	5	5	5	4