



MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2017-2018 Fall

CSE 4088 Introduction to Machine Learning

COURSE DESCRIPTION FORM

Offering Department		Department of Computer Engineering		Technical Elective				
Course Code		CSE4088						
Course Name		Introduction to Machine Learning						
Language of Instruction		English						
ECTS		5						
Contact Hours		Theoretical (T): 3	Practice (P): 0	Laboratory (L):-				
Pre-requisites		Senior standing						
Instructor		Name	Borahan Tümer					
		E-mail	borahan.tumer@marmara.edu.tr					
Course Materials		Mandatory	Introduction to Machine Learning, Ethem Alpaydın, 3 rd edition, MIT Press					
		Recommended	Lecture slides					
Course Objectives		The goal of this course is to give the students an understanding of basic machine learning algorithms. Statistical inference is the basic concept that underlies most of the methods that will be covered in the course. The students will also be able to apply the algorithms and concepts to real world problems.						
Course Content		Supervised learning; Bayesian learning; parametric and non-parametric density estimation; dimensionality reduction; clustering; decision trees; hidden Markov models; reinforcement learning.						
Learning Outcomes		LO1	Explain the basic methods in machine learning.					
		LO2	Apply a suitable machine learning method to a problem.					
		LO3	Implement and observe the performance of different machine learning methods for a problem.					
		LO4	Combine various machine learning approaches to solve a problem.					
		LO5	Explain different approaches in machine learning that solve similar problems.					
Program Outcomes		LO1	LO2	LO3	LO4	LO5		
PO4		Ability to devise (a), select, and use (b) modern techniques and tools needed for engineering practice (1); ability to employ information technologies effectively (2).	1a	1a	1b			
PO5		Ability to design (a) and conduct experiments, gather data (b), analyze and interpret results for investigating engineering problems (c).		b		c	c	
Subjects (Knowledge, Skills and Behaviours), Contributions of Subjects to Learning Outcomes, Assessment Methods	No	Week	Subjects	LO1	LO2	LO3	LO4	LO5
	S1	1-2	Introduction to machine learning	MF				
	S2	3-4	Supervised learning; Bayesian decision theory	MF				
	S3	5-7	Parametric methods (for univariable or multivariable data)		P			MF
	S4	8	Dimensionality reduction	MF		MF, P		P
	S5	9	Clustering	MF		MF, P	P	
	S6	10	Non-parametric methods		P	MF		MF
	S7	11	Decision trees					MF
	S8	12-13	Hidden Markov models	MF				MF
S9	14	Reinforcement learning		MF				
Assessment Methods and Weights	No	Type	Weight	Implementation Rule		Make-up Rule		
	MF	Midterm, Final	55%	Exams will be open books and notes. Calculators are allowed.		Marmara University regulations will be followed for make-up exams.		
	Q	Quiz	5%	Quizzes will be done to test the concepts covered in class before the midterm and final exams.				
	P	Project	40%	The course project consists of analysis, design, and coding phases. Each phase will be evaluated separately.				
TOTAL			100%					
Determining Letter Grades		<ul style="list-style-type: none"> The letter grades will be determined based on the midterm and final exams, projects and quizzes. In order to determine the letter grade, a curve or catalog based method will be followed based on the total average scores of the students. The final exam score and the total average score of the student must be at least 35 to pass the course. According to Marmara University Undergraduate regulations, the weight of the final exam must be at least 40 out of 100. 						

Assessment	Midterm	Quizzes	Project	Final	TOTAL
Weight	15	5	40	40	100

Teaching Method, Student Work Load	Time Applied by the Instructor			
	No	Method	Explanation	Hours
	1	Lectures	Lectures are given in class using the board or via presentations. Example questions are solved to enhance the concepts.	14x3=42
	2	Problem Session/ Practice	Problems related to the course topics are solved on the board.	
	3	Laboratory	Experiments are done in the laboratory or theoretical concepts covered during the lectures are practiced using computer exercises.	
	4	Interactive Courses	Questions are asked to students during lectures and they are encouraged to guess the answers (peer learning is also in this category)	
	5	Field Work	Students attend activities outside the campus.	
	6	Midterm	Midterm exam is given during the midterm week.	2
	7	Final	Final exam is given during the final exam week.	2
	Estimated Time to be Allocated by a Student			
	8	Project	The students carry out research about the problem given in the project, design and implement their solution and prepare a report.	3x18=54
	9	Quiz	Quizzes will be done unannounced.	2
	10	Pre-class learning of Course Material	The students study and learn the new subjects from course materials.	
11	Review of Course Material	Students review the course subjects from course materials to prepare for the exams and homeworks.	21	
12	Office Hour	Students ask questions to the instructor or the assistant during office hours.	2	
Total			125	
Academic Honesty	<p>Violations of scholastic honesty include, but are not limited to cheating, plagiarizing, fabricating information or citations, facilitating acts of dishonesty by others, having unauthorized possession of examinations, submitting work of another person or work previously used without informing the instructor, or tampering with the academic work of other students.</p> <p>In case academic dishonesty is observed, the first authority is the instructor of the course. The instructor may decide to give the student zero for the homework(s)/lab(s)/exam(s), give the letter grade FF, or may take disciplinary action.</p>			