MARMARA UNIVERSITY - FACULTY OF ENGINEERING

2017-2018 Spring

CSE4062 Introduction to Data Science and Analytics

COURSE DESCRIPTION FORM

Offering Department	Department of Computer Engineering	Technical Elective	
Course Code	CSE4062		
Course Name	Introduction to Data Science and Analytics		
Language of Instruction	English		
ECTS	5		
Contact Hours	Theoretical (T): 3	Practice (P): -	Laboratory (L): -
Pre-requisites			
Instructor	**Name**	Murat Can Ganiz	
	E-mail	murat.ganiz@marmara.edu.tr	
Course Materials	**Mandatory**	Cielen, D., Ali, M., & Meysman, A. (2016). Introducing data science. Manning Publ. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline.O'Reilly. 2014	
	Recommended	Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press. 2014.	
Course Objectives	To teach students basic concepts and techniques in the fast developing field of data science and data analytics, to inform them about current tools necessary for real life data science projects and make projects using these tools, and to give an idea of how to solve data science problems in different disciplines with hybrid teams.		
Course Content	Basic concepts of data science, basic statistical methods, exploratory data analysis, descriptive data analytics, predictive data analytics, machine learning methods used in data science, modeling with machine learning algorithms, model evaluation methods, visualization methods, large data storage and processing frameworks .		
Learning Outcomes	**LO1**	To have general information about data science processes	
	LO2	To be able to apply basic statistical methods and preprocessing methods used in data analysis	
	LO3	To be able to apply descriptive data science processes	
	LO4	To be able to apply predictive data science processes	
	LO5	To work effectively in multi-disciplinary teams in Data Science projects	

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).		1b,2	1b,2	1b,2			
PO6	Ability to work efficiently in intra-disciplinary (a) and multi-disciplinary teams (b); ability to work individually (c).					b		
PO10	Information about business life practices such as project management, risk management, and change management (a); awareness of entrepreneurship, innovation (b), and sustainable development (c).	a						

	No	**Week**	**Subjects**	**LO1**	**LO2**	**LO3**	**LO4**	**LO5**		
Subjects (Knowledge, Skills and Behaviours), **Contributions of Subjects to Learning Outcomes,** **Assessment Methods**	**S1**	1-2	Data science and related concepts	MF						
	S2	3	Basic statistical methods in data analysis		M					
	S3	4	Exploratory data analysis, data science processes and basic tools		M					
	S4	5	Feature selection and feature generation		M			P		
	S5	6	Descriptive data science methods, basic unsupervised machine learning algorithms (k-means)			F				
	S6	7-9	Predictive data science methods, basic supervised machine learning algorithms (linear regression, k-nearest Neighbors, naïve bayes, decision trees)				F	P		
	S7	10	Evaluation and measurement of data science models				F	P		
	S8	11	Large scale data analysis - introduction to big data analysis, distributed data storage and analysis methods	F						
	S9	12-13	Effective data science reporting and	F						

			communication with Information Visualization								
	S10	14	Data science and ethical issues, personal information protection, data security and ethics discussions	F							

Assessment Methods and Weights

No	Type	Weight	Implementation Rule	Make-up Rule
MF	Midterm, Final	60%	Exams, are done by books and all course materials closed. No calculation and communication tools are allowed during exams.	Marmara University regulations will be followed for make-up exams.
Q	Quiz	-	-	
H	Homeworks	-	-	
P	Project	40%	Data science topics are applied to real life or academic data sets in multidisciplinary teams.	
TOTAL		100%		

Determining Letter Grades

- The letter grades will be determined based on the midterm and final exams, project and homeworks.
- 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	Projects	Homeworks	Final	TOTAL
Weight	20	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
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.	40
9	Homeworks	The students solve the problems given as homework.	
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.	36
12	Office Hour	Students ask questions to the instructor or the assistant during office hours.	2
Total			129

Academic Honesty

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.

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.