COURSE INFORMATON					
Course Title	*Code*	*Semester*	*L+P Hour*	*Credits*	*ECTS*
Foundation of Machine Learning and Its Applications	CIS 522	-	3+0+0	3	10

Prerequisites

Language of Instruction	English
Course Level	Master's Degree
Course Type	Elective
Course Coordinator	Assist. Prof. Engin Kandıran
Instructors	Assist. Prof. Engin Kandıran
Assistants	R.Asst. Cengiz Karataş
Goals	This course aims at providing a theoretical and practical basis for machine learning and its use with business problems.
Content	Introduction to Machine Learning, Decision Trees, Instance Based Learning, Bayesian Learning, Logistic Regression, Neural Networks, Support Vector Machines, Model Selection, Feature Selection, Clustering, k-means, Expectation Maximization, Mixture of Gaussians, Ensemble Learning, Deep Learning, Adversarial Learning, Reinforcement Learning

Learning Outcomes	Program Learning Outcomes	Teaching Methods	Assessment Methods
Student will understand machine learning fundamentals.	6	1,4	A,B,C
Student will learn a set of well-known supervised, unsupervised and semi-supervised learning algorithms.	6,9,8	1,2,3,4	A,B,C
Student will able to program solutions to some given real world machine learning problems.	6	1,2,3,4	A,B,C
Student will complete a project, write report and present in class on a topic in machine learning.	6	1	A
Given the parameters of a problem, students should be able to describe the advantages and disadvantages of different machine learning methods.	6	1,2,3,4	A,B,C

Teaching Methods:	1: Lecture, 2: Question-Answer, 3: Discussion, 4: Lab Work
Assessment Methods:	A: Testing, B: Laboratory C: Homework D: Project

COURSE CONTENT

Week	Topics	Study Materials
1	Introduction to Machine Learning	Lecture Notes
2	Decision Trees	Lecture Notes
3	Instance Based Learning	Lecture Notes
4	Bayesian Learning	Lecture Notes
5	Logistic Regression Neural Networks	Lecture Notes
6	MIDTERM EXAMINATION	
7	Support Vector Machines	Lecture Notes
8	Model Selection and Feature Selection	Lecture Notes
9	Clustering, k-means, Expectation Maximization, Mixture of Gaussians	Lecture Notes
10	Model Ensembles	Lecture Notes
11	Deep Learning	Lecture Notes
12	Adversarial Machine Learning Reinforcement Learning	Lecture Notes
13	Final Examination	

RECOMMENDED SOURCES

Textbook	● Introduction to Machine Learning (2nd Edition), Ethem Alpaydin, The MIT Press,2010 ● Pattern Recognition and Machine Learning, Christopher M. Bishop, Springer, 2006 ● Machine Learning, Tom Mitchell, McGraw-Hill, 1997
Additional Resources	Stephen Haunts , A Gentle Introduction to Agile Software Development, Stephen Haunts Ltd., 1th Ed., 2017.

MATERIAL SHARING

Documents	Presentations and Laboratory Sheets furnished by MSAA
Assignments	Homework Sheets furnished by MSAA
Exams	Old exam questions are furnished

ASSESSMENT

IN-TERM STUDIES	NUMBER	PERCENTAGE
Mid-terms	1	20

Projects	1	50
Assignment and Labwork	5	30
Total		100
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE		40
CONTRIBUTION OF IN-TERM STUDIES TO OVERALL GRADE		60
Total		100

COURSE CATEGORY	Expertise/Field Courses

COURSE'S CONTRIBUTION TO PROGRAM						
No Program Learning Outcomes	Contribution					
	1	2	3	4	5
1 Software Development graduates have the knowledge and the skills to design and develop the complete systems for multi-media visual user interface.					
2 Software Development graduates have advanced the knowledge and skills to design, develop and install the application systems for multi-media.	X				
3 Software Development graduates have the knowledge and the skills to design, develop and apply algorithms and data structures to solve the basic problems of information processing, within the framework of discrete mathematics.				X	
4 Software Development graduates have the knowledge and the skills to design and develop computer applications, based on user specified requirements, using modern structured development tools and install them on various hardware platforms and deploy their usage.			X		
5 Software Development graduates have the knowledge and the skills to design and develop computer applications, based on user specified requirements, using modern object-oriented development tools and install them on various hardware platforms and deploy their usage(ACM 321).				x	
6 Software Development graduates know the logic of computer operating systems, the basic set of system commands, how to control access to system resources by users of different departments and how to monitor the running of jobs in the system (ACM 369, 370).					X
7 Software Development graduates have the knowledge and the skills to design and develop data models serving different requirements, database applications that would access and process data using various types of software, including queries, reports and business applications.			X		
8 Software Development graduates have the knowledge and the skills to design and develop business applications that would provide data acess, modification and processing for data kept in enterprise database systems .					

9	Software Development graduates have the knowledge about computer networks, and have the skills to design, develop and monitor computer networks, how to configure them and how to maintain their performance.	X
10	Software Development graduates have the knowledge and the skills to design and develop visual user interfaces for the web, web-based applications for n-tier client/server configurations, how to deploy them in enterprises.	x

ECTS ALLOCATED BASED ON STUDENT WORKLOAD BY THE COURSE DESCRIPTION			
Activities	Quantity	Duration (Hour)	Total Workload (Hour)
Course Duration (Not including the exam week: 13x Total course hours)	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	4	45
Mid-terms	1	2	2
Project	1	50	50
Homework	3	30	90
Final examination	1	3	3
Total Work Load			240
Total Work Load / 25 (h)			9,60
ECTS Credit of the Course			10