ENGR 421 (01) INTRODUCTION TO MACHINE LEARNING

Fall 2021

1. Course Information

Instructor:	Mehmet Gönen, mehmetgonen@ku.edu.tr
KU Credits:	3.00
ECTS Credits:	6.00
Prerequisite(s):	Prerequisite: MATH 107 and 203 and ENGR 200 AND COMP 110 or 125 or 131
Class Location & Meeting Times:	SOS SGKM - Monday, Wednesday 14:30-15:40
PS (Yes/No):	No
DS (Yes/No):	No
Lab (Yes/No):	Yes
Language of Instruction:	English
Office Hours:	Monday 13:00-14:10 and Wednesday 10:00-11:10, face-to-face at ENG 118 or online at Google Meet (https://meet.google.com/tux-bkzg-ugi)

Teaching Assistant(s):

	E-Mail	**Phone**	**Office - Office Hours**
•Binnur Sahin	BSAHIN16@KU.EDU.TR		
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2. Course Description

A broad introduction to machine learning covering regression, classification, clustering, and dimensionality reduction methods; supervised and unsupervised models; linear and nonlinear models; parametric and nonparametric models; combinations of multiple models; comparisons of multiple models and model selection.

3. Course Overview

Machine learning uses interdisciplinary techniques such as statistics, linear algebra, optimization, and computer science to create automated systems that can process large volumes of data to make predictions or decisions without explicit human intervention. This course (a) introduces students to a broad range of machine learning algorithms to prepare them for research/industry applications, (b) shows them how to combine multiple algorithms to obtain better results, and (c) shows them how to assess the performance of the algorithms.

4. Course Learning Outcomes (CLOs):

CLO #	**Upon successful completion of this course, students will be able to**…
1	comprehend the core differences in analyses enabled by regression, classification, clustering, and dimensionality reduction algorithms.
2	select the appropriate machine learning algorithms for real-life applications.
3	assess the model quality in terms of relevant performance/error metrics for each application.
4	apply machine learning algorithms to real-life problems and optimize the models learned.

5. Assessment Methods

Method	Description	Weight %
Homework	Homeworks	40.00
Midterm Exam	Midterm Exam	20.00
Final Exam	Final Exam	40.00
	Total:	100.00

6. Instructional Material and Learning Resources

- Introduction to Machine Learning, Edition: 4th (ISBN: 978-0-262-043793)
  Author: Ethem Alpaydın
  Publisher: The MIT Press (Year: 2020)
  Material Type: Textbook
  Material Status: Required
- Active Use of Course Page on Blackboard: https://ku.blackboard.com/
- KOLT Tutoring: No Service Available

7. Course Schedule

Meeting Times	Subject
SEP 27	Introduction (Chapter 1)
SEP 28	NO LAB
SEP 29	Supervised Learning (Chapter 2)
OCT 4	Parametric Methods (Chapter 4)
OCT 5	LAB 01: Parametric Methods
OCT 6	Parametric Methods (Chapter 4)
OCT 11	Multivariate Methods (Chapter 5)
OCT 12	LAB 02: Parametric Methods
OCT 13	Linear Discrimination (Chapter 10)
OCT 18	Linear Discrimination (Chapter 10)
OCT 19	LAB 03: Linear Discrimination
OCT 20	Linear Discrimination (Chapter 10)
OCT 25	Multilayer Perceptrons (Chapter 11)
OCT 26	LAB 04: Linear Discrimination
OCT 27	Multilayer Perceptrons (Chapter 11)
NOV 1	Multilayer Perceptrons (Chapter 11)
NOV 2	LAB 05: Multilayer Perceptrons
NOV 3	Nonparametric Methods (Chapter 8)
NOV 8	Nonparametric Methods (Chapter 8)
NOV 9	LAB 06: Nonparametric Methods
NOV 10	Decision Trees (Chapter 9)
NOV 15	NO LECTURE
NOV 16	NO LAB
NOV 17	NO LECTURE

NOV 22	Decision Trees (Chapter 9)
NOV 23	LAB 07: Decision Trees
NOV 24	Kernel Machines (Chapter 14)
NOV 29	Kernel Machines (Chapter 14)
NOV 30	LAB 08: Kernel Machines
DEC 1	Kernel Machines (Chapter 14)
DEC 6	Dimensionality Reduction (Chapter 6)
DEC 7	LAB 09: Kernel Machines
DEC 8	Dimensionality Reduction (Chapter 6)
DEC 13	Dimensionality Reduction (Chapter 6)
DEC 14	LAB 10: Dimensionality Reduction
DEC 15	Clustering (Chapter 7)
DEC 20	NO LECTURE
DEC 21	LAB 11: Clustering
DEC 22	Clustering (Chapter 7)
DEC 27	Combining Multiple Learners (Chapter 18)
DEC 28	LAB 12: Combining Multiple Learners
DEC 29	Combining Multiple Learners (Chapter 18)
JAN 3	Design and Analysis of Machine Learning Experiments (Chapter 20)
JAN 4	NO LAB
JAN 5	Design and Analysis of Machine Learning Experiments (Chapter 20)

8. Student Code of Conduct and Academic Grievance Procedure

Student Code of Conduct

Statement on Academic Honesty with Emphasis on Plagiarism

Academic Grievance Procedure

9. Course Policies

10. Other