

ENGR 421 (01) INTRODUCTION TO MACHINE LEARNING

Spring 2023

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 B07 - Monday, Wednesday 13:00-14:15
PS (Yes/No):	No
DS (Yes/No):	No
Lab (Yes/No):	Yes
Language of Instruction:	English
Office Hours:	Monday 11:30-12:45 and Wednesday 10:00-11:15, 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
•Ronglei Ji	RJI19@KU.EDU.TR		
•Mehmet Can Oktay	MOKTAY15@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	6 Homeworks (Lowest grade will be dropped)	20.00
Midterm Exam	2 Midterm Exams	40.00
Final Exam	Final Exam	40.00
Total:		100.00

6. Instructional Material and Learning Resources

- Introduction to Machine Learning, Edition: 4th (ISBN: 978-0-262-358064)
Author: Ethem Alpaydm
Publisher: The MIT Press (Year: 2020)
Material Type: Textbook
Material Status: Required
Additional Notes: <https://mitpress.mit.edu/9780262358064/introduction-to-machine-learning/>
- Active Use of Course Page on Blackboard: <https://ku.blackboard.com/>
- KOLT Tutoring: No Service Available

7. Course Schedule

Meeting Times	Subject
FEB 27	Introduction (Chapter 1)
MAR 1	Supervised Learning (Chapter 2)
MAR 3	NO LAB
MAR 6	Parametric Methods (Chapter 4)
MAR 8	Parametric Methods (Chapter 4)
MAR 10	LAB 01: Parametric Methods
MAR 13	Multivariate Methods (Chapter 5)
MAR 15	Linear Discrimination (Chapter 10)
MAR 17	LAB 02: Parametric Methods
MAR 20	Linear Discrimination (Chapter 10)
MAR 22	Linear Discrimination (Chapter 10)
MAR 24	LAB 03: Linear Discrimination
MAR 27	Multilayer Perceptrons (Chapter 11)
MAR 29	Multilayer Perceptrons (Chapter 11)
MAR31	LAB 04: Linear Discrimination
APR 3	Nonparametric Methods (Chapter 8)
APR 5	Nonparametric Methods (Chapter 8)
APR 7	LAB 05: Multilayer Perceptrons
APR 10	Decision Trees (Chapter 9)
APR 12	Decision Trees (Chapter 9)
APR 14	LAB 06: Nonparametric Methods
APR 17	NO LECTURE
APR 19	NO LECTURE
APR 21	NO LAB

APR 24	Kernel Machines (Chapter 14)
APR 26	Kernel Machines (Chapter 14)
APR 28	LAB 07: Decision Trees
MAY 1	NO LECTURE
MAY 3	Kernel Machines (Chapter 14)
MAY 5	LAB 08: Kernel Machines / LAB 09: Kernel Machines
MAY 8	Dimensionality Reduction (Chapter 6)
MAY 10	Dimensionality Reduction (Chapter 6)
MAY 12	LAB 10: Dimensionality Reduction
MAY 15	Clustering (Chapter 7)
MAY 17	Clustering (Chapter 7)
MAY 19	NO LAB
MAY 22	Combining Multiple Learners (Chapter 18)
MAY 24	Combining Multiple Learners (Chapter 18)
MAY 26	LAB 11: Clustering
MAY 29	Design and Analysis of Machine Learning Experiments (Chapter 20)
MAY 31	Design and Analysis of Machine Learning Experiments (Chapter 20)
JUN 2	LAB 12: Combining Multiple Learners

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

(i) If you miss one of the midterms with a valid excuse, your final grade will be counted as your missing grade.

10. Other