
Middle East Technical University
Department of Computer Engineering

CENG499 Introduction to Machine Learning
Fall 2021 – 2022 Syllabus

Instructor

Assoc. Prof. Dr. Şeyda Ertekin

Phone: 210 5509 Email: seyda@ceng.metu.edu.tr Office: B108

Office Hour: Thursdays 14:40 - 15:30 and by appointment.

Teaching Assistant

Muhammed Yasin Ulaş

Email: myulas@ceng.metu.edu.tr Office: B203

Office Hour: Wednesdays 14:40 - 15:30 and by appointment.

Lecture Hours

Wednesday 15:40 – 16:30, @ BMB5 or online.

Thursday 15:40 – 17:30, @ BMB5 or online.

Newsgroup

Course Forums at ODTUClass

Course Conduct (Tentative)

The number of students registered for the course exceeds the capacity of the classrooms in our department, so there will be a sign-up sheet on ODTUClass for each lecture which will determine who can come to the classroom for that lecture. At the same time, the others can attend that lecture via the Zoom meeting, which will be recorded. Also, during the term, there will be recitations explaining the homeworks, and they will be conducted just like the lectures. Finally, the midterm and final will consist of online and in-class questions/parts. That is, the online part will be THE (Take Home Exam), and the in-class part requires you to come to the classrooms.

Course Objectives: At the end of the course, the student will be able to,

- formulate machine learning problems and propose viable solutions to these,
- manipulate data to extract features and information necessary for solutions,
- design and evaluate machine learning systems,
- use tools created for data mining and machine learning,
- understand and apply different machine learning algorithms to appropriate problems.

Textbooks and Course Materials:

- Machine Learning, Tom Mitchell, 1997
- Introduction to Machine Learning, Ethem Alpaydın, 2004
- Lecture notes
- Lecture slides
- Pattern Classification, 2nd edition, Richard O. Duda, Peter E. Hart, David G. Stork, 2000

Course Outline (Tentative)

- Introduction to Machine Learning
- Fundamentals of Learning
- Structural Risk Minimization
- Multiclass Classification (One vs One / One vs All)
- Perceptron Algorithm
- Artificial Neural Networks
- Parameter Tuning, Cross Validation
- K-Nearest Neighbour Algorithm
- Performance Metrics
- K-Means Clustering
- Curse of Dimensionality
- Hierarchical Divisive / Agglomerative Clustering
- Mining Association Rules
- Decision Tree Learning
- Deep Learning
- Support Vector Machines
- Kernel Based Learning
- Active Learning
- Linear / Logistic Regression
- Bayesian Learning
- Naive Bayes
- Bayesian Networks
- Stochastic Process
- Hidden Markov Models

Grading (Tentative)

- Assignments (THE): 30%
- Quiz & Attendance: 15%
- Midterm: 25%
- Final: 30%

Assignments

There will be 4 programming assignments. You will have 3 days in total for late submission throughout the term for the assignments. The late submission penalty will be calculated using $5d^2$, that is, 1 day late submission will cost you 5 points, 2 days will cost 20 points, and 3 days will cost 45 points. No late submission is accepted after reaching a total of 3 late days.

Code of Honour

Any work you submit must be your own. Any action against code of honour will result in an investigation by the department honour committee. You will not be given a further warning.