

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Course Details						
Code			Academic Year		Semester	
EBT357			4		7	
Title			T	A	L	ECTS
Introduction to Machine Learning			3	1	0	6
Language		English				
Level		Undergraduate	X	Graduate		Postgraduate
Department / Program		Energy Science and Technology				
Forms of Teaching and Learning		Face-to-face				
Course Type		Compulsory		Elective	X	
Objectives		The aim of this course is to provide students with a fundamental understanding of machine learning (ML) techniques and algorithms. Students will acquire practical skills in machine learning by learning key processes such as data analysis, modeling, and evaluation. Additionally, the course aims to develop students' comprehension of the theoretical foundations of machine learning and how machine learning algorithms are developed.				
Content		This course covers the fundamental concepts, methods, and applications related to machine learning. The content is supported by both theoretical knowledge and practical examples, aiming to equip students with the ability to analyze machine learning methods, develop applications, and interpret results.				
Prerequisites		None				
Coordinator		Dr. Kaan Deveci				
Lecturer(s)		Dr. Kaan Deveci				
Assistant(s)		Dr. Kaan Deveci				
Work Placement		None				
Recommended or Required Reading						
Books / Lecture Notes		Goodfellow, I., Bengio, Y., & Courville, A. (2016). Deep learning. MIT Press. http://www.deeplearningbook.org . Machine Learning, Tom Mitchell, McGraw Hill, 1997. https://www.cs.cmu.edu/~tom/mlbook.html				
Other Sources		Course notes Google Python eğitim notları, https://developers.google.com/edu/python/				
Additional Course Material						
Documents		-				
Assignments		4 assignments and 1 term project				
Exams		1 midterm and 1 final				
Course Composition						

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Mathematics und Basic Sciences	25	%
Engineering	25	%
Engineering Design	-	%
Social Sciences	-	%
Educational Sciences	-	%
Natural Sciences	25	%
Health Sciences	-	%
Expert Knowledge	25	%

Assessment

Activity	Count	Percentage (%)
Midterm Exam	1	20
Quiz	-	-
Assignments	4	20
Attendance	-	5
Recitations	-	-
Projects	1	15
Final Exam	1	40
Total		100

ECTS Points and Work Load

Activity	Count	Duration	Work Load (Hours)
Lectures	14	3	42
Self-Study	12	6	72
Assignments			
Presentation / Seminar Preparation	1	15	15
Midterm Exam	1	2	2
Recitations			
Laboratory	14	1	14
Projects	1	20	20
Final Exam	1	2	2
Total Work Load			168
ECTS Points (Total Work Load / Hour)			6

Learning Outcomes

1	Students will be able to explain the fundamental concepts and theoretical foundations of machine learning.
2	Students will be able to implement various machine learning algorithms and understand their advantages and limitations.
3	Students will be able to perform data preprocessing, model selection, and evaluation.

DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

4	Students will gain knowledge on advanced topics such as feedforward neural networks and deep learning.
5	Students will be able to apply machine learning models to real-world datasets and analyze the results.

Weekly Content

1	Introduction to Machine Learning
2	Supervised Learning – Linear Regression
3	Supervised Learning – Logistic Regression
4	Supervised Learning – Classification
5	Unsupervised Learning – Clustering
6	Support Vector Machines
7	Feedforward Neural Networks
8	Midterm Exam
9	Data Preprocessing, Cleaning, and Model Selection
10	Model Evaluation Metrics
11	Principal Component Analysis
12	Reinforcement Learning
13	Model Ensembles
14	Ethics
15	Project Work
16	Final Exam

Contribution of Learning Outcomes to Program Objectives (1-5)

	P1	P2	P3	P4	P5	P6	P7
1	4	5	4	3	4	3	3
2	4	5	5	3	5	4	3
3	3	4	4	2	5	4	3
4	4	5	5	3	5	4	2
5	4	5	5	3	5	5	3

Contribution Level 1: Low 2: Low-intermediate 3: Intermediate 4: High 5: Very High

P1 Working with modern scientific sources.

P2 Having modern scientific knowledge and scientific analysis abilities and being able to apply them to scientific problems.

P3 Having theoretical and practical skills in the area of Energy Science and Technology.

P4 Having foreign language skills to follow the worldwide advancements in the field of Energy Science and Technology and to be able to discuss them with foreign colleagues.

P5 Having computational skills for research data analysis purposes.

P6 Having appropriate skills for academic and industrial jobs, being ready to take responsibility in working life.

P7 Having knowledge about work occupational work and safety.

Compiled by:

Kaan Deveci



DEPARTMENT OF ENERGY SCIENCE AND TECHNOLOGY
COURSE SYLLABUS

Date of Compilation:

16.06.2025