Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
VM 532	Machine Learning	2	4	0	0	3	8

Prerequisites	
Admission Requirements	

Language of Instruction	English
Course Type	Compulsory
Course Level	Masters Degree
Objective	The objective of this course is to provide students with a solid foundation in machine learning and deep learning. By covering both theoretical concepts and practical applications, students will learn to design, implement, and evaluate various machine learning models for solving real-world problems.
Content	The course content includes an introduction to machine learning, mathematical foundations, deep learning basics, training models, convolutional and recurrent neural networks, advanced models like GANs and autoencoders, natural language processing, and practical project work.
References	https://udlbook.github.io/udlbook/ https://www.amazon.com/Hundred-Page-Machine-Learning-Book/dp/199957950X https://www.di.ens.fr/appstat/spring-2023/

Theory Topics

Week	Weekly Contents
1	Overview of machine learning, types of learning, and applications.
2	Lineer and logistic regression.
3	Introduction to Python programming for ML, libraries (NumPy, Pandas).
4	Neural Networks Basics - Understanding neural networks, activation functions, and architecture.
5	Deep Learning Fundamentals - Introduction to deep learning, frameworks, and setting up the environment.
6	Training Deep Neural Networks - Techniques for training DNNs, avoiding overfitting, and regularization.
7	Convolutional Neural Networks (CNNs) - Basics of CNNs, applications in image recognition.
8	Midterm Exam - Assessment covering all previously seen topics
9	Recurrent Neural Networks (RNNs) - Introduction to RNNs, LSTM, and their applications.
10	Advanced Deep Learning Models - Exploring GANs, autoencoders, and reinforcement learning basics.
11	Deep Learning for Sequential Data - Time series analysis, RNNs for sequence data.
12	Natural Language Processing with Deep Learning - Techniques and models for NLP.
13	Project Discussions - Students present their projects, discussion, and feedback.
14	Project Presentations - Final presentation of projects, course wrap-up, and future directions.