

Machine Learning

COURSE SYLLABUS

LECTURER:
PHONE:
EMAIL ADDRESS:
CLASS HOURS: 45 hours
CREDITS: 3 credits

A. COURSE DESCRIPTION

This course offers a practical and engaging introduction to machine learning, designed for beginners. You will learn the basics, starting with understanding how machines learn from data. The course covers key topics like predicting outcomes (regression) and sorting items into categories (classification), using simple language and hands-on examples. You will explore popular machine learning tools and methods, such as decision trees and support vector machines (SVMs), while using beginner-friendly libraries like **Sklearn** and **Slatesmodel**. By the end of the course, you'll be able to create, test, and improve models to solve real-world problems. Ideal for those interested in AI, this course mixes theory with practical skills to prepare you for further studies or a career in machine learning.ds theory with practice to prepare learners for further studies or careers in machine learning.

Data Scientist is the sexiest job in the world!

B. COURSE ORGANIZATION

The course on Machine Learning is meticulously designed to span over a comprehensive curriculum, encompassing a wide range of topics from foundational concepts to advanced techniques in machine learning and deep learning. The course is organized into distinct sessions, each aimed at achieving specific learning outcomes that progressively build upon each other to ensure a thorough understanding and practical knowledge of machine learning algorithms, models, and applications.

C. COURSE PREREQUISITE

N/A

D. COURSE LEARNING OUTCOME (LO)

Upon completion of this course, the students will be able to:

LO1	Define and explain machine learning fundamentals, differentiate between supervised and unsupervised learning.
LO2	Comprehend linear regression concepts, construct a linear regression model, and analyze the cost function to optimize model performance.
LO3	Apply polynomial regression techniques, identify overfitting and underfitting issues, and utilize regularization methods to enhance model reliability and performance.
LO4	Grasp the fundamentals of classification, implement logistic regression models, and understand the cost function to evaluate and optimize classification performance.
LO5	Construct decision trees, apply regression trees, and utilize random forests to improve prediction accuracy and address overfitting.
LO6	Comprehend KNN fundamentals, elucidate the mathematics behind KNN, and

	deploy KNN models for classification and regression tasks.
LO7	Understand SVM variants, define hyperplane and large margin concepts, and implement SVM models for classification and regression.
LO8	Present a machine learning project by defining the problem, preparing data, justifying model selection, evaluating and optimizing the model, and demonstrating its real-world application.

E. COURSE OUTLINE

Week	Session	Topic	Learning Outcomes	Number ofHour
1	1	Foundation Machine Learning <ul style="list-style-type: none"> Overview About Machine Learning Application of Machine Learning Supervised Learning vs Unsupervised Learning 	LO1	1.5
	2	Linear Regression <ul style="list-style-type: none"> Understanding Linear Regression Building a Linear Regression Model Cost function, los function 	LO2	1.5
	3	Advancing with Regression <ul style="list-style-type: none"> Polynomial Regression Overfitting and Underfitting Regularization Techniques 	LO3	3
2	1	Classification Techniques <ul style="list-style-type: none"> Basics of Classification Logistics Regression Theory Cost Function in Linear Regression 	LO4	3
	2	Decision Tree <ul style="list-style-type: none"> Introduction to Decision Trees Algorithms Building Decision Trees Regression Tree (optional) Random Forests 	LO5	3
3	1	K nearest Neighbors <ul style="list-style-type: none"> Intro KNNs Mathematics behind KNNs Building KNNs 	LO6	3
	2	Support Vector Machines <ul style="list-style-type: none"> Types of SVMs Hyperplane in the SVMs Large Margin Building SVMs 	LO7	3
4	1	Final Project Presentation	LO8	3

***These course outlines and schedules are subject to change without prior notice.

F. RESOURCES AND REQUIRES SUPPLIES

References:

1. [Hands-on Machine Learning with Scikit-Learn, Keras, and TensorFlow](#)
2. [Data Science for Business](#)
3. [Deep Learning Specialization](#)

Coursework will be assessed as follows:

G. METHOD OF ASSESSMENT

- **Class Activity Involvement: 30%**
- **Mid-term Data Literacy Exam: 30%**
- **Final assessment: 40%**

I. CLASSROOM RULES OF CONDUCT

1. You should come to class regularly for better understanding of the lessons and you need to complete the assignments and projects. Any reports of free-riders within the group will be investigated, and you will get 0pt on your presentation if you have no contribution to the project work.
2. Please raise your hand if you have any questions. Questions will always be encouraged in this class. Activeness is appreciated!
3. As a student, you need to respect your classmates when they express their ideas or raise questions. In addition, you can also share your ideas if you have any!