

STQD6024: MACHINE LEARNING
2nd SEMESTER: ACADEMIC YEAR 2024/2025

Name and course code: STQD 6024, Machine Learning

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Course Evaluation:	• Assignments	40%
	• Test	20%
	• Final Exam	40%

Course synopsis:

This course aims to expose students on concepts, techniques and algorithms in machine learning. Machine learning revolves around the development of a computer system, which is able to self-learning and improving through experience and recorded data. This course is among main technologies in Big Data and its applications in various fields. Among common topics covered are neural network, decision tree and support vector machines. Among advanced topics covered are ensemble and unsupervised learning also reinforcement and reinforcement learning.

Course objectives:

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

1. study the steps in machine learning process,
2. suggest suitable analysis in machine learning,
3. analyze a situation and able to apply methods in machine learning,
4. making a decision and conclusions which can be understood from the results of the analysis.

References:

1. James, G., Witten, D., Hastie, T., & Tibshirani, R. 2021. An introduction to statistical learning: with Applications in R (2nd Ed.). New York: Springer.
2. Géron, A. 2019. Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow: Concepts, Tools, and Techniques to Build Intelligent Systems (2nd Ed.). O'Reilly Media, Inc.
3. Raschka, S., & Mirjalili, V. 2019. Python Machine Learning: Machine Learning and Deep Learning with Python, scikit-learn, and TensorFlow 2 (3rd Ed.). Packt Publishing Ltd.
4. Chollet, F. 2021. Deep Learning with Python (2nd Ed.). Manning Publications
5. Goodfellow, I., Bengio, Y. & Courville, A. 2016. Deep Learning (Adaptive Computation and Machine Learning series). The MIT Press.

COURSE CONTENTS

Lectures	Contents	Notes
Wk 1	Introduction to Machine Learning <ul style="list-style-type: none">• Types of Learning• Regression vs Classification• Model Accuracy Linear Regression <ul style="list-style-type: none">• Simple linear regression• Multiple Linear Regression• KNN regression	
Wk 2	NO LECTURE	
Wk 3	Classification: <ul style="list-style-type: none">• Logistic regression• Linear Discriminant Analysis• KNN classifier Resampling Methods <ul style="list-style-type: none">• Cross-Validation• Bootstrap	Assignment 1
Wk 4	NO LECTURE	
Wk 5	Linear Model Selection <ul style="list-style-type: none">• Subset Selection• Shrinkage Methods• Dimension Reduction• High Dimensional Data Nonlinear Models <ul style="list-style-type: none">• Polynomial regression• Step & Basis Functions• Splines• Local Regression• GAM	
Wk 6	NO LECTURE	
Wk 7	NO LECTURE	

MID SEMESTER BREAK		
Wk 9	Tree Based Methods <ul style="list-style-type: none"> • Decision Trees • Bagging • Random Forests • Boosting Support Vector Machines	Assignment 2
Wk 10	NO LECTURE	
Wk 11	Unsupervised Learning <ul style="list-style-type: none"> • PCA • Clustering techniques 	Test (20%)
Wk 12	NO LECTURE	
Wk 13	Neural Network Deep Learning	
Wk 14	NO LECTURE	
Wk 15	NO LECTURE	
STUDY WEEK		
FINAL EXAMINATION WEEKS		

