BIRZEIT UNIVERSITY
Faculty of Engineering and Technology
Department of Computer Science

Course information:
- **A. Course Code:** COMP4388
- **B. Course Name:** Introduction to Machine Learning
- **C. Prerequisite:** COMP242 and MATH234
- **D. Co-requisite:** None

Instructors Information:
- **A. Name: Dr. Radi Jarrar**
- **B. Email:** rjarrar@birzeit.edu
- **C. Office hours: M (11h30-14h00), T (11h00 – 12h00)**

Course Description:

This unit provides an introduction to machine learning and statistical pattern recognition. The main areas covered in this course include: review for statistical methods needed for Machine Learning, supervised learning (Linear and Logistic Regression, Parametric/non-parametric algorithms, Naive Bayes, Support Vector Machines, Neural Networks, Decision Trees, and model and feature selection), unsupervised learning, learning theory and, best practices in ML (Bias/Variance tradeoff and various statistical measures of data). This course will also discuss recent technologies and applications in the field of Machine Learning including applications on data mining, forecasting and predictive analytics, image mining and computer vision, speech recognition, and text processing.

Course Goals:

The main goal of this course is to provide students with the fundamental knowledge in the field of Machine Learning.

Course Outcomes:

Upon successful completion of this course, the student will be able to:
- **A.** Knowledge and understanding
    1. Understand the fundamental concepts of machine learning algorithms
    2. Gain intuition and better understanding on how to deal with data and machine learning algorithms
- **B.** Intellectual/Cognitive skills
    1. Identify problems that can be solved using machine learning techniques and which method fits better with the existing type of data
    2. Distinguish between Binary and Multiclass classification as well Supervised vs. Unsupervised learning
- **C.** Subject specific and practical skills
    1. Implement basic machine learning algorithms

D. General and transferable skills
1. Communication and oral skills by discussing matters related to the field
2. Working in groups to design and implement solutions to machine learning related problems
3. State conclusions that the evaluations and comparisons of different algorithms support

Course Content:

Week #	Course Content Topic	Assignments and Due Date
1	- Introduction to Machine Learning	
2, 3	- EDA (Exploratory Data Analysis)	
4, 5	Supervised Learning - Linear Regression - Logistic Regression	
6, 7	- Model Evaluation	
Midterm Exam		
8	- k-Nearest Neighbour	
9	- Decision Trees	
10	- Naive Bayes	
11	- Support Vector Machines	
12, 13	- Artificial Neural Networks	
14, 15	Unsupervised Learning - K-Means Clustering	
Final Exam		

Teaching and learning method:
A. Lectures – introduce new concepts, and theory
B. Class discussion for more understanding and give examples

Assessment methods based on outcomes:
1. Exams to asses A1, A2, B1, B2, C1
2. Projects to assess A2, B1, B2, C1, D1, D2, D3

*Weighting of assessments***:**

Midterm Exam	30%
Assignments/Projects	30%
Final Exam	40%
Total	100%

References:

 A. Essential books /text books
  1. Machine Learning. Tom Mitchell, McGrew Hill, 1997

 B. Recommended books and Readings
  1. Machine Learning, The art and science of algorithms that make sense of data. Peter Flach, 2012
  2. Pattern Recognition and Machine Learning. Christopher Bishop, 2007

* There is plenty of other textbooks and online resources on this topic. Other books that cover the material in this course are acceptable as well. This course will be self containing where possible and any additional material will be specified and sent via Ritaj.