Syllabus for
MLEARN 210
Introduction to Machine Learning

Location: Self-paced
Start date: 9/17/18

Instructor: Mohamed Mneimneh

mlearn1@uw.edu

Office Hours/Consultation: upon request

COURSE DESCRIPTION:

Machine learning is the branch of artificial intelligence that entails learning from data. This course introduces the terminology and core concepts from the field of machine learning. Students will gain hands-on experience with linear models for both classification and regression, including data preprocessing, dimensionality reduction, feature selection, model construction, regularization, and model selection. Models will be constructed using data from a variety of application domains. Models to be covered include:

- linear regression
- polynomial regression
- logistic regression
- linear discriminant analysis
- quadratic discriminant analysis
- ridge regression
- lasso regression
- elastic net regression
- k nearest neighbor regression

- k nearest neighbor classification
- naive Bayes classification
- Bayesian network classification
- regression splines
- local regression
- additive models

COURSE LEARNING OBJECTIVES:

After successfully completing this course, you will be able to:

- Use foundational concepts from calculus, linear algebra, probability, statistics, and the **Python programming** language to solve problems;
- Define and use core concepts and terminology from the field of machine learning;
- Construct linear models for regression and classification;
- Construct nearest neighbor models for regression and classification;
- Construct graphical models, including naïve Bayes and Bayesian network models;
- Construct generalized additive models, including regression splines and local regression;
- Select features to improve model performance;
- Regularize models;
- Preprocess data, including normalization and dimensionality reduction; and
- Tune models and evaluate model performance.

COURSE FORMAT:

This is a self-paced online course, meaning you will be responsible for making weekly progress following the course schedule. You will watch video lectures, read online materials, watch demonstrations of the lab exercises and try some of those by yourself. There will be online quizzes, lab assignments, and discussions about the lesson topics and activities.

COURSE MATERIALS:

Required Textbook (free online)
James, Witten, Hastie, and Tibshirani. An Introduction to Statistical Learning (w/Applications in R)
http://www.statlearning.com

Additional Python Resource
https://www.learnpython.org/

VIRTUAL LABS:

Using Virtual Labs

We'll be using Python for this course. Each student will get his or her own virtual environment identified by an email address when you first access the learner dashboard.

Our virtual lab environment will be running an app called Jupyter Notebook. Jupyter Notebooks allow instructors to present each exercise in one single document where students can see the instructions for the exercise, fill in the blank to complete the code, and run the code. You will not need to install any software to run this lab, you just need a browser

COURSE TOPICS:

Lesson	Topics
0	Program and Course Overview
1	Introduction to Statistical Learning
2	Linear Regression
3	Classification
4	Model Building, Part 1
5	Model Building, Part 2
6	Resampling Methods
7	Linear Model Selection and Regularization
8	Moving Beyond Linearity
9	Bayesian Analysis
10	Dimensionality Reduction

STUDENT ASSESSMENT:

To successfully complete this course, you must:

- Answer all of the quiz questions
- Submit all lab assignments

You will need an overall average score of 80% or more to pass this course. Your grade for this course will be recorded on your transcript as SC (satisfactory completion) or USC (unsatisfactory completion).

Grading Table:

Your grades are based on the following components:

Component	**Percentage**
Knowledge Checks	25%
Lab Assignments	75%
Total	**100%**

Knowledge Checks: Each lesson, after completing the reading and viewing lecture, attempt the Knowledge Checks. You will have two attempts. These are designed to help you know you have mastered core concepts and are ready to move on to the Labs.

Lab Assignments: There will be one lab assignment per lesson. The lab assignments are an opportunity for you to demonstrate that you are able to complete the exercises and analysis in a more independent way. You will use the virtual lab environment to complete the coding assignment and then submit the file or URL to the assignment section in the learning platform.

STUDENT CODE POLICY:

The University of Washington's student conduct code applies to all students, including students enrolled in UW Professional & Continuing Education courses. Students are expected to maintain the highest standards of academic responsibility. Plagiarism and other kinds of academic misconduct are considered serious offenses at the UW. Plagiarism is using someone else's words or ideas without proper citation. It can range from failure to credit a single sentence or paragraph to passing off an entire article, speech or another student's paper as one's own.

Instances of academic dishonesty for noncredit courses are handled by the University of Washington Professional & Continuing Education Committee on Academic Conduct. If evidence of academic misconduct is established, the student will be given a failing grade for the course and any request for a refund of course or other fees will be denied.

STUDENT SERVICES:

Accessibility and Accommodations

Your experience in this class is important to us, and it is the policy and practice of the University of Washington to create inclusive and accessible learning environments consistent with federal and state law. The Disability Services Office (DSO) provides accommodation, referral information, and assistance for professional and continuing education students with a documented physical, mental, or sensory disability.
If you have already established accommodations with DSO, please communicate your approved accommodations to your instructor at your earliest convenience so we can discuss your needs in this course. If you have not yet established services through DSO, but have a temporary or permanent disability that requires accommodations (this can include but not limited to; mental health, attention-related, learning, vision, hearing, physical or health impacts), you are welcome to contact DSO at 206-543-6450 or dso@uw.edu or via their Contacts page.

Library Services

The University of Washington library system offers access to millions of print volumes and many online resources. Students in UW Professional & Continuing Education programs can check out materials at UW libraries beginning the first day of the quarter for which they are enrolled. It is important to know that you will need to set up your UW student NetID to access the library online and the associated husky card to check-out items in person. See library resourcesespecially for UWPCE students.

ABOUT YOUR INSTRUCTOR

Mohamed Mneimneh has been with SAP Labs for ten years, holding roles as research scientist, software engineer, product manager and principal solution adviser. Mneimneh helps companies digitally transform their business using machine learning and data science. He holds a Ph.D. in computer and electrical engineering with a focus on machine learning from Marquette University. While not working, he enjoys spending time and traveling with his wife and two boys.