

Course: DS – 630 Machine Learning (WINTER TRIMESTER 2020)

Detailed Course Plan

Unit	Topic	Learning Objectives	Readings	"To Do"
Week #1 Nov 30 – Dec 6	Review syllabus Setting up Python environments The machine learning landscape	1. Understand what is machine learning 2. Know what are major types of machine learning systems	Geron: Chapter 1	Week 1 Blackboard discussion Discussion is due Friday by EOD. Comments to other students' discussion is due by EOW (Sunday 11:59pm) Week 1 Homework hw 1 is due by EOW (Sunday 11:59pm)
Week #2 Dec 7 – 13	End-to-End machine learning project Classification	1. Know the key steps for end to end machine learning project 2. Understand classification algorithm 3. Know how to train a binary classifier with error analysis	Geron: Chapter 2 & 3	Week 2 Blackboard discussion Discussion is due Friday by EOD. Comments to other students' discussion is due by EOW (Sunday 11:59pm) Week 2 Homework hw 2 is due by EOW (Sunday 11:59pm)
Week #3 Dec 14 – 20 Dec 24 – Jan 3 (Holiday Break)	Training models Support vector machines	1. Learn major training modeling including linear regression, polynomial regression, and logistic regression 2. Learn linear and nonlinear SVM classification algorithms 3. Understand SVM regression	Geron: Chapter 4 & 5	Week 3 Blackboard discussion Discussion is due Friday by EOD. Comments to other students' discussion is due by EOW (Sunday 11:59pm) Week 3 Homework hw 3 is due by EOW (Sunday 11:59pm)
Week #4 Jan 4 - 10	Decision trees Ensemble learning and random forests	1. Learn decision trees algorithm 2. Understand metrics used to evaluate tree based algorithms 3. Know random forest and boosting methods for machine learning	Geron: Chapter 6 & 7	Week 4 Blackboard discussion Discussion is due Friday by EOD. Comments to other students' discussion is due by EOW (Sunday 11:59pm) Week 4 Homework hw 4 is due by EOW (Sunday 11:59pm)

Week #5 Jan 11 – 17	Mid-term exam			
Week #6 Jan 18 - 24	Dimensionality reduction Unsupervised learning techniques	<ol style="list-style-type: none"> 1. Understand major techniques for dimension reduction 2. Know PCA and Kernel PCA methods 3. Learn clustering and gaussian mixture techniques 	Geron: Chapter 8 & 9	<p>Week 6 Blackboard discussion Discussion is due Friday by EOD. Comments to other students' discussion is due by EOW (Sunday 11:59pm)</p> <p>Week 6 Homework</p> <p>hw 5 is due by EOW (Sunday 11:59pm)</p>
Week #7 Jan 25 - 31	Neural networks with Keras	<ol style="list-style-type: none"> 1. Understand what are neurons and know how to build a neural network 2. Implement MLPs with Keras 3. Learn how to fine-tuning neural network hyperparameters 	Geron: Chapter 10	<p>Project proposal is due by EOW (week 7 Sunday 11:59pm)</p> <p>Week 7 & 8 Blackboard discussion Discussion is due week 8 Friday by EOD. Comments to other students' discussion is due by EOW (week 8 Sunday 11:59pm)</p>
Week #8 Feb 1 – 7	Training deep neural networks	<ol style="list-style-type: none"> 1. Understand how to train deep neural networks 2. Learn avoiding overfitting through regularization 	Geron: Chapter 11	<p>Week 7 & 8 Homework</p> <p>hw 6 is due by EOW (week 8 Sunday 11:59pm)</p>
Week #9 Feb 8 - 14	Custom models and training with TensorFlow Loading and preprocessing data with TensorFlow	<ol style="list-style-type: none"> 1. Know what is TensorFlow 2. Study customizing models and training algorithms 3. Understand how to use TensorFlow data API 	Geron: Chapter 12 & 13	<p>Week 9 & 10 Blackboard discussion Discussion is due week 10 Friday by EOD. Comments to other students' discussion is due by EOW (week 10 Sunday 11:59pm)</p> <p>Week 9 & 10 Homework</p>
Week #10 Feb 15 - 21	Deep computer vision using CNN	<ol style="list-style-type: none"> 1. Understand CNN architectures 2. Understand deep learning applications on computer vision 	Geron: Chapter 14	hw 7 is due by EOW (week 10 Sunday 11:59pm)
Week #11 Feb 22 - 28	Final exam and final project	<ol style="list-style-type: none"> 1. Apply the machine learning techniques you have learned in your final project 		<p>Final exam due by EOW (Sunday 11:59pm)</p> <p>Final project report due by EOW (Sunday 11:59pm)</p>