

Course Schedule - ECE 657A - Winter 2021

Week	Type	Date	Topic	Subtopics
1	Lecture A	Mon - Jan 11	Introduction	AI vs ML, Motivation, Course Logistics
1	Lecture B	Tue - Jan 12	Preprocessing Data	Data representations, normalization, scaling
1	Lecture B	Tue - Jan 12	Summarizing Data	Mean, variance, skew, kurtosis, PCC, cross correlation, autocorrelation
1	Lecture B	Tue - Jan 12	Data Cleaning	Outliers, Histograms, Missing Data
1	Lecture S	Fri - Jan 15	Comparison Measures	dot product, hamming, mikowski, cosine
1	Lecture S	Fri - Jan 15	Experimental Methodology	Train, Validate, Test, Ablation Studies
2	Lecture A	Mon - Jan 18	Classification I	Supervised Learning, Distance Based, k-Nearest Neighbours
2	Lecture B	Tue - Jan 19	Statistics, Evaluation Metrics	Confusion Matrices, Accuracy, precision, f-measure, MSE, RMSE, ROC and AUC Curves
2	Assignment	Wed - Jan 20	Assignment 1 Released	Data Cleaning, Experimental Train/Test/Validate, Ablation, Hypoth Test, Probabilities, k Nearest Neighbours classification for target results
2	Lecture S	Fri - Jan 22	Background Review of Probability	Probability Basics, Bayes Theorem, Entropy, KL-Divergence, Hypothesis Testing
3	Lecture A	Mon - Jan 25	Parameter Estimation	Bias, MLE, MAP, Naïve Bayes, EM
3	Calendar	Fri - Jan 29	Calendar	Drop date
4	Lecture A	Mon - Feb 1	Classification II	Decision Tree based, Ensemble Methods including Random Forests, XG-Boost, Mondrian Forests
4	Assignment	Wed - Feb 3	Assignment 2 released	Parameter estimation and basic classification on two standard ML Datasets and covid data using knn, decision trees, naïve bayes. For param estimation they can try different distributions to fit with MAP and MLE
4	Assignment	Wed - Feb 3	Assignment 1 Due	
4	Lecture B	Wed - Feb 3	Classification III	Boosting, Gradient Trees, Streaming Data
5	Test	Thu - Feb 11	Test 1	Data Cleaning, Parameter Estimation, kNN, Experimental Train/Test/Validate, Ablation, Hypoth Test, Probabilities, Decision Trees and Ensemble Methods
5	Lecture S	Fri - Feb 12	Representation Learning	Feature extraction : PCA, LDA, ISOMAP, LLE
5	Lecture S	Fri - Feb 12	Representation Learning	Dimensionality Reduction and Manifold Learning

6	Break	Fri - Feb 19	Reading Week	
7	Lecture A	Mon - Feb 22	Document Classification	Vector Embeddings : TF-IDF, Word2Vec, BERT
7	Assignment	Wed - Feb 24	Assignment 3 released	Feature Extraction, Dimensionality Reduction, Word Embeddings, Decision Trees, SVM
7	Assignment	Wed - Feb 24	Assignment 2 Due	
7	Lecture B	Wed - Feb 24	Classification IV	SVM, Kernel Methods and Latent Models
8	Lecture A	Mon - Mar 1	Semi-/Self-/Unsupervised	Clustering: Partition, Hierarchical, Model and Density based, k-means, DBScan
8	Lecture B	Wed - Mar 3	Anomaly Detection	Anomaly Detection: Classification, Outlier, Density, and Isolation based
8	Lecture S	Fri - Mar 5	semi-/Self-/Unsupervised	Clustering evaluation measures
9	Lecture A	Wed - Mar 10	Review	Review for Test 2
9	Lecture B	Wed - Mar 10	Deep Learning	Fundamentals of Neural Networks, Backprop, optimizers, activation functions
9	Test	Thu - Mar 11	Test 2	Feature Extraction, Dimensionality Reduction, Word Embeddings, SVM, Clustering, Anomaly Detection
10	Calendar	Mon - Mar 15	2-Day Scheduled Pause (no classes Mon,Tues)	
10	Assignment	Fri - Mar 19	Assignment 4 released	Deep Learning
10	Assignment	Fri - Mar 19	Assignment 3 Due	
11	Lecture A	Mon - Mar 22	Deep Learning	Deep Learning Fundamentals
11	Lecture A	Mon - Mar 22	Deep Learning	Effective Deep Learning Training Methods: Attention, Regularization, Optimizers
11	Lecture B	Wed - Mar 24	Deep Learning : Classification	Data, Image and Timeseries classification using Deep Learning
12	Lecture A	Mon - Mar 29	Deep Learning	Reusing Information: ResNet, Inception, Densenet
12	Lecture A	Mon - Mar 29	Representation Learning	Autoencoders
13	Lecture B	Wed - Apr 7	Additional Learning Topics	Transfer Learning and Attention
13	Lecture S	Fri - Apr 9	Deep Learning: Representation	Variational Autoencoders and GANs
14	Test	Mon - Apr 12	Test 3	Core Course Materials and Deep Learning
14	Calendar	Wed - Apr 14	Calendar	End of Classes
14	Calendar	Thu - Apr 15	Calendar	2 Study Days
14	Calendar	Sat - Apr 17	Calendar	Beginning of Exams

15	Assignment	Tue - Apr 20	Assignment 4 Due	
16	Calendar	Mon - Apr 26	Calendar	End of Exams