| 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 | Preprocesing Data | Data reprsentations, 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 Methodolc | 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 Me | 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 P | Probability Basics, Bayes Theorem, Entropy, KL-Divergence, Hypothesis Testing |
| 3 | Lecture A | Mon - Jan 25 | Parameter Estimation I | Bias, Logistic Regression, MLE |
| 3 | Lecture B | Tue - Jan 26 | Parameter Estimation II | 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 classifciation on two standard ML Datasets and covid data using knn, decision trees, naïve bayes. For param estimation they can try different disitributions 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-/Unsuprevise | 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-/Unsuprevise | 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, optimzers, activiation 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 : Classific | 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 Topi | Transfer Learning and Attention |
| 13 | Lecture S | Fri - Apr 9 | Deep Learning: Represer | 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 |