1. Neural Networks and Deep Learning

**Week 1:** Introduction, NN, Why Deep learning

**Week 2:** Logistic regression, Gradient Descent, Derivatives, Vectorization, Python Broadcasting

**Week 3:** NN, Activation function, Backpropagate, Random Initialization

**Week 4:** Deep L-layer Neural network, Matrix dimension right, Why Deep representation, Building blocks of NN, Parameters vs Hyperparameters, Relationship with brain

1. Improving Deep Neural Networks: Hyperparameter tuning,Regularization and Optimization

**Week 1:** Train/Dev/Test set, Bias/Variance, Regularization, Why regularization, Dropout, Normalizing inputs, vanishing/exploding gradients, Gradient checking

**Week 2:** Mini-batch, Exponentially weighted average, GD with momentum, RMSProp, Adam optimizer, Learning rate decay, Local optima problem, Plateaus problem

**Week 3:** Tuning process, Picking hyperparameter, Normalizing activations, Softmax regression, Deep learning programming framework

1. Structuring Machine Learning Projects

**Week 1:** Why ML Strategy?, Orthogonalization, Single number evaluation metric, Satisficing and optimizing metrics, Train/dev/test distribution, Human level performance, Avoidable bias

**Week 2:** Error analysis, Incorrectly labeled data, Data augmentation, Transfer learning, Multitask learning, End-to-End Deep learning

1. Convolutional Neural Networks

**Week 1:** Computer vision, Edge detection, Padding, Strided convolution, Convolutions over volume, Pooling layers, CNN, Why CNN?

**Week 2:** LeNet-5, AlexNet, VGG-16, ResNets, 1x1 convolutions, InceptionNet, Data augmentation

**Week 3:** Object localization, Landmark detection, Object detection, Sliding window, Bounding box prediction, Intersection over union(IOU), Non-max suppression, Anchor box, YOLO algorithm

**Week 4:** Face recognition, One-shot learning, Siamese network, Neural style transfer

1. Sequence Models

**Week 1:** RNN, Notation, Vanishing gradient, GRU, LSTM, Bidirectional RNN, Deep RNN

**Week 2:** Word representation, Word embedding, Cosine similarity, Word2Vec, Negetive sampling, GloVe words, Debiasing word

**Week 3:** Beam search, Error analysis in Beam search, Bleu score, Attention model, Speech recognition