



Schedule and Syllabus

Unless otherwise specified the course lectures and meeting times are Tuesday and Thursday 12pm to 1:20pm in the NVIDIA Auditorium in the Huang Engineering Center. ([map](#))

This is the syllabus for the **Spring 2017** iteration of the course. The syllabus for the [Winter 2016](#) and [Winter 2015](#) iterations of this course are still available.

Event Type	Date	Description	Course Materials
Lecture 1	Tuesday April 4	<b>Course Introduction</b> Computer vision overview Historical context Course logistics	<a href="#">[slides]</a> <a href="#">[video]</a>
Lecture 2	Thursday April 6	<b>Image Classification</b> The data-driven approach K-nearest neighbor Linear classification I	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">[python/numpy tutorial]</a> <a href="#">[image classification notes]</a> <a href="#">[linear classification notes]</a>
Lecture 3	Tuesday April 11	<b>Loss Functions and Optimization</b> Linear classification II Higher-level representations, image features Optimization, stochastic gradient descent	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">[linear classification notes]</a> <a href="#">[optimization notes]</a>
Lecture 4	Thursday April 13	<b>Introduction to Neural Networks</b> Backpropagation Multi-layer Perceptrons The neural viewpoint	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">[backprop notes]</a> <a href="#">[linear backprop example]</a> <a href="#">[derivatives notes]</a> (optional) <a href="#">[Efficient BackProp]</a> (optional) related: <a href="#">[1]</a> , <a href="#">[2]</a> , <a href="#">[3]</a> (optional)
Lecture 5	Tuesday April 18	<b>Convolutional Neural Networks</b> History Convolution and pooling ConvNets outside vision	<a href="#">[slides]</a> <a href="#">[video]</a> ConvNet notes
Lecture 6	Thursday April 20	<b>Training Neural Networks, part I</b> Activation functions, initialization, dropout, batch normalization	<a href="#">[slides]</a> <a href="#">[video]</a> Neural Nets notes 1 Neural Nets notes 2 Neural Nets notes 3 tips/tricks: <a href="#">[1]</a> , <a href="#">[2]</a> , <a href="#">[3]</a> (optional) Deep Learning <a href="#">[Nature]</a> (optional)
A1 Due	Thursday April 20	<b>Assignment #1 due</b> kNN, SVM, SoftMax, two-layer network	<a href="#">[Assignment #1]</a>
Lecture 7	Tuesday April 25	<b>Training Neural Networks, part II</b> Update rules, ensembles, data augmentation, transfer learning	<a href="#">[slides]</a> <a href="#">[video]</a> Neural Nets notes 3
Proposal due	Tuesday April 25	Couse Project Proposal due	<a href="#">[proposal description]</a>
Lecture 8	Thursday April 27	<b>Deep Learning Software</b> Caffe, Torch, Theano, TensorFlow, Keras, PyTorch, etc	<a href="#">[slides]</a> <a href="#">[video]</a>
Lecture 9	Tuesday May 2	<b>CNN Architectures</b> AlexNet, VGG, GoogLeNet, ResNet, etc	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">AlexNet</a> , <a href="#">VGGNet</a> , <a href="#">GoogLeNet</a> , <a href="#">ResNet</a>
Lecture 10	Thursday May 4	<b>Recurrent Neural Networks</b> RNN, LSTM, GRU Language modeling Image captioning, visual question answering Soft attention	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">DL book RNN chapter</a> (optional) <a href="#">min-char-rnn</a> , <a href="#">char-rnn</a> , <a href="#">neuraltalk2</a>
A2 Due	Thursday May 4	<b>Assignment #2 due</b> Neural networks, ConvNets	<a href="#">[Assignment #2]</a>
Midterm	Tuesday May 9	<b>In-class midterm</b> Location: <a href="#">Various</a> ( <b>not</b> our usual classroom)	
Lecture 11	Thursday May 11	<b>Detection and Segmentation</b> Semantic segmentation Object detection Instance segmentation	<a href="#">[slides]</a> <a href="#">[video]</a>
Lecture 12	Tuesday May 16	<b>Visualizing and Understanding</b> Feature visualization and inversion Adversarial examples DeepDream and style transfer	<a href="#">[slides]</a> <a href="#">[video]</a> <a href="#">DeepDream</a> <a href="#">neural-style</a> <a href="#">fast-neural-style</a>
Milestone	Tuesday May 16	Course Project Milestone due	
Lecture 13	Thursday May 18	<b>Generative Models</b> PixelRNN/CNN Variational Autoencoders Generative Adversarial Networks	<a href="#">[slides]</a> <a href="#">[video]</a>
Lecture 14	Tuesday May 23	<b>Deep Reinforcement Learning</b> Policy gradients, hard attention Q-Learning, Actor-Critic	<a href="#">[slides]</a> <a href="#">[video]</a>
Guest Lecture	Thursday May 25	<b>Invited Talk: <a href="#">Song Han</a></b> Efficient Methods and Hardware for Deep Learning	<a href="#">[slides]</a> <a href="#">[video]</a>
A3 Due	Friday May 26	<b>Assignment #3 due</b>	<a href="#">[Assignment #3]</a>
Guest Lecture	Tuesday May 30	<b>Invited Talk: <a href="#">Ian Goodfellow</a></b> Adversarial Examples and Adversarial Training	<a href="#">[slides]</a> <a href="#">[video]</a>
Lecture 16	Thursday June 1	Student spotlight talks, conclusions	<a href="#">[slides]</a>
Poster Due	Monday June 5	<b>Poster PDF due</b>	<a href="#">[poster description]</a>
Poster Presentation	Tuesday June 6		
Final Project Due	<b>Monday June 12</b>	Final course project due date	<a href="#">[reports]</a>