



Syllabus and Course Schedule

Time and Location: Wed 11:30 AM - 12:50 PM, [NVIDIA Auditorium](#)

Past schedules: ([Spring 2018](#)) ([Winter 2018](#)) ([Fall 2017](#))

For all "Materials and Assignments", follow the deadlines listed on this page, not on Coursera!
Assignments are usually due every Wednesday, 30min before the class starts

Event	Date	Description	Materials and Assignments
Neural Networks and Deep Learning (Course 1)			
Lecture 1	09/26	Advanced Lecture Topics: <ul style="list-style-type: none">AI is the new electricityDetails of the course	Handouts <ul style="list-style-type: none">Week 1 slidesNotation convention
Lecture 2	10/03	Advanced Lecture Topic: Deep Learning Intuition <ul style="list-style-type: none">How to frame a machine learning problem?How to choose your loss function?Intuition behind various real-world application of deep learning. Completed modules: <ul style="list-style-type: none">C1M1: Introduction to deep learningC1M2: Neural Network Basics	Handouts <ul style="list-style-type: none">Lecture 2: Various Deep Learning Topics (Spring 2018 slides)Week 2 slidesC1M1 slidesC1M2 slides Required: <ul style="list-style-type: none">Find partner(s) for your final project and sign up here (link coming soon) Quizzes (due at 11am): <ul style="list-style-type: none">Introduction to deep learningNeural Networks Basics Programming Assignments (due at 11am) <ul style="list-style-type: none">Python Basics with Numpy (Optional)Logistic Regression with a neural network mindset

Event	Date	Description	Materials and Assignments
Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization (Course 2)			
Lecture 3	10/10	<p>Advanced Lecture Topic:</p> <ul style="list-style-type: none"> • Full-Cycle of a deep learning project • The Mathematics of Deep Learning (backpropagation, initialization, regularization) <p>Completed modules:</p> <ul style="list-style-type: none"> • C1M3: Shallow Neural Network • C1M4: Deep Neural Networks 	<p>Handouts</p> <ul style="list-style-type: none"> • The Mathematics of Deep Learning • C1M3 slides • C1M4 slides • Lecture 3: The Mathematics of Deep Learning (Spring 2018 slides) <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • Shallow Neural Networks • Key concepts on Deep Neural Networks <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Planar data classification with a hidden layer • Building your Deep Neural Network: step by step • Deep Neural Network - Application
Project Proposal Due	10/14 Sunday 11:59PM		
Lecture 4	10/17	<p>Advanced Lecture Topics:</p> <ul style="list-style-type: none"> • Attacking neural networks with Adversarial examples • Generative Adversarial Networks <p>Completed modules:</p> <ul style="list-style-type: none"> • C2M1: Practical aspects of deep learning 	<p>Handouts</p> <ul style="list-style-type: none"> • C2M1 slides • C2M2 slides • C2M3 slides (optional) • Week 4 slides <p>Optional Video</p> <ul style="list-style-type: none"> • Batch Normalization videos from C2M3 will be useful for the in-class lecture.

Event	Date	<ul style="list-style-type: none"> • C2M2: Optimization algorithms Description	Materials and Assignments
			<p>Optional Reading</p> <ul style="list-style-type: none"> • Explaining and Harnessing Adversarial Examples • Adversarial Examples in the Physical World • Adversarial Attacks on Neural Network Policies • The Gan Zoo • Generative Models, OpenAI blog • StackGAN: Text to Photo-realistic Image Synthesis with Stacked Generative Adversarial Networks • NIPS 2016 Tutorial: Generative Adversarial Networks • Unsupervised Representation Learning with Deep Learning Convolutional Generative Adversarial Networks • Image-to-Image Translation with Conditional Adversarial Networks • Photo-Realistic Single Image Super-Resolution Using a Generative Adversarial Network • Unpaired Image-to-Image Translation Using Cycle-Consistent Adversarial Networks • Adversarial Logit Paring <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • Practical aspects of deep learning • Optimization Algorithms <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Initialization

Event	Date	Description	Materials and Assignments
			<ul style="list-style-type: none"> Regularization Gradient Checking Optimization
Structuring Machine Learning Projects (Course 3)			
Lecture 5	10/24	<p>Advanced Lecture Topics:</p> <ul style="list-style-type: none"> AI in Health Care (Guest Speaker: Pranav Rajpurkar) Live-cell segmentation Case Study <p>Completed modules:</p> <ul style="list-style-type: none"> C2M3: Hyperparameter Tuning, Batch Normalization C3M1: ML Strategy (1) C3M2: ML Strategy (2) 	<p>Handouts</p> <ul style="list-style-type: none"> C2M3 slides C3M1 slides C3M2 slides Lecture 5: Live-cell segmentation case study <p>Optional Reading</p> <ul style="list-style-type: none"> Understanding the difficulty of training deep feedforward neural networks <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> Hyperparameter tuning, Batch Normalization, Programming Frameworks Bird recognition in the city of Peacetopia (case study) Autonomous driving (case study) <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> Tensorflow
Midterm Review	10/30		<p>Handouts</p> <ul style="list-style-type: none"> Midterm Review Slides Optimization and Initialization Slides Adversarial Examples Notes Adversarial Examples Jupyter Notebook

Event	Date	Description	Materials and Assignments
Convolutional Neural Networks (Course 4)			
Lecture 6	10/31	<p>Advanced Lecture Topic:</p> <ul style="list-style-type: none"> • Deep Learning Project strategy - Case studies <p>Completed modules:</p> <ul style="list-style-type: none"> • C4M1: Foundations of Convolutional Neural Network • C4M2: Deep Convolutional Models 	<p>Handouts</p> <ul style="list-style-type: none"> • 2018 Winter Midterm Without Solutions • 2018 Winter Midterm With Solutions • 2018 Spring Midterm Without Solutions • 2018 Spring Midterm With Solutions • C4M1 slides • C4M2 slides <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • The basics of ConvNets • Convolutional models <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Convolutional Neural Network - Step by Step • Convolutional Neural Network - Application • Keras Tutorial: This assignment is optional. • Residual Networks
Midterm	11/02 Friday		<p>Midterm Exam</p> <ul style="list-style-type: none"> • Date: November 02, 2018 • Time: 3pm - 6pm • Locations: <ul style="list-style-type: none"> Last names A-K: STLC 111 (Google Maps) Last names L-Z: Cubberley Auditorium (Google Maps)

Event	Date	Description	Materials and Assignments
Alternate Midterm	11/05 Monday		Alternate Midterm Exam <ul style="list-style-type: none">• Date: November 05, 2018• Time: 6pm - 9pm• Location: 260-113

Event	Date	Description	Materials and Assignments
Lecture 7	11/07	<p>Advanced Lecture Topics:</p> <ul style="list-style-type: none"> • Interpretability of Neural Network <p>Completed modules:</p> <ul style="list-style-type: none"> • C4M3: ConvNets Applications (1) • C4M4: ConvNets Applications (2) 	<p>Handouts</p> <ul style="list-style-type: none"> • C4M3 slides • C4M4 slides • Week 7 slides <p>Optional Reading</p> <ul style="list-style-type: none"> • A guide to convolution arithmetic for deep learning • Is the deconvolution layer the same as a convolutional layer? • Visualizing and Understanding Convolutional Networks • Deep Inside Convolutional Networks: Visualizing Image Classification Models and Saliency Maps • Understanding Neural Networks Through Deep Visualization • Learning Deep Features for Discriminative Localization • Inceptionism: Going Deeper into Neural Networks <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • Detection Algorithms • Special Applications: Face Recognition and Neural Style Transfer <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Car Detection with YOLOv2 • Art Generation with Neural Style Transfer • Face recognition for the Happy House

Event	Date	Description	Materials and Assignments
Project Milestone Due	11/09 Friday 11:59pm		
Sequence Models (Course 5)			
Lecture 8	11/14	<p>Advanced Lecture Topic:</p> <ul style="list-style-type: none"> • Career Advice • Reading Research Papers <p>Completed modules:</p> <ul style="list-style-type: none"> • C5M1: Recurrent Neural Networks 	<p>Handouts</p> <ul style="list-style-type: none"> • C5M1 slides <p>Optional Reading</p> <ul style="list-style-type: none"> • Dropout: A Simple Way to Prevent Neural Networks from Overfitting • DenseNet: Densely Connected Convolutional Networks <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • Recurrent Neural Networks <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Building a Recurrent Neural Network - Step by Step • Dinosaur Land -- Character-level Language Modeling • Jazz improvisation with LSTM
Thanksgiving break (Enjoy!)			

Event	Date	Description	Materials and Assignments
Lecture 9	11/28	<p>Advanced Lecture Topics:</p> <ul style="list-style-type: none"> • Deep Reinforcement Learning <p>Completed modules:</p> <ul style="list-style-type: none"> • C5M2: Natural Language Processing and Word Embeddings • C5M3: Sequence-to-Sequence Models 	<p>Handouts</p> <ul style="list-style-type: none"> • Week 9 slides • C5M2 slides • C5M3 slides <p>Optional Reading</p> <ul style="list-style-type: none"> • Mastering the Game of Go without Human Knowledge • Human-level control through deep reinforcement learning • Model-Agnostic Meta-Learning for Fast Adaptation of Deep Networks • Generative Adversarial Imitation Learning <p>Quizzes (due at 11am):</p> <ul style="list-style-type: none"> • Natural Language Processing and Word Embeddings • Sequence Models and Attention Mechanism <p>Programming Assignments (due at 11am):</p> <ul style="list-style-type: none"> • Operations on Word Vectors - Debiasing • Emojify! • Neural Machine Translation with Attention • Trigger Word Detection
Lecture 10	12/05	<p>Advanced Lecture Topic</p> <p>Lecture will be held this day! No assignments due, work on your final projects.</p>	

Event	Date	Description	Materials and Assignments
Poster Session	12/14 Friday		Poster Session <ul style="list-style-type: none">• Date: December 14, Friday• Time: TBD• Location: ACSR basketball courts
Final Project Report Due	12/16 Sunday, 11:59pm		