

# Syllabus

## CS236606 Deep Learning

### Topics:

- Motivation, historical perspective
- Statistical learning setting
- Linear classifiers
- The perceptron algorithm
- Artificial neuron – properties and biological motivation
- Linear regression, logistic regression
- Stochastic gradient descent and its variants
- Multi-class learning
- Multi-layered neural networks
- The computation graph – chain rule and backpropagation
- Regularization – L1, L2, Dropout, Batch normalization, Initialization
- Convolutional neural networks (CNNs)
- Analysis of well known CNN architectures
- Applications of CNNs in machine vision – super resolution, style transfer, localization and segmentation
- Recurrent neural networks – from RNN to LSTM, sequence modeling
- Language models, word embedding.
- RNN applications – seq2seq, speech, machine translation, attention
- Unsupervised learning – Clustering, Auto-encoders, GANs
- Reinforcement learning (RL) and deep RL – deep Q learning and policy gradient
- Theoretical motivation

### HW:

- 4-5 H.W (both dry and wet), submission in pairs.
- Final project – A research oriented final project in pairs.

**Lecturer:** Professor Ran El-Yaniv

**Teaching Assistants:** Yonatan Geifman, Izik Golan

**Credit points:** 3 (2 hour lecture and 1 hour tutorial each week)

**Lectures:** Sunday 14:30-16:30

**Tutorials:** Monday 9:30-10:30, Tuesday 15:30-16:30