

Syllabus

COS 432/COS 532 : Deep Learning

Fall 2020

Professor: [Bruce MacLeod](#)

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Office Hours: M 12:45 PM - 1:30 PM

W 1:00 PM - 2:30 PM or by appointment

Course Objectives:

This class provides a practical introduction to deep learning, including theoretical motivations and how to implement it in practice. As part of the course we will cover multilayer perceptrons, backpropagation, automatic differentiation, and stochastic gradient descent. After some background material, we start by introducing convolutional networks for image processing, starting from the simple LeNet to more recent architectures such as ResNet. Secondly, we discuss sequence models and recurrent networks, such as LSTMs, GRU, and the attention mechanism. The goal of the course is to provide both a good understanding and good ability to build modern nonparametric estimators. The course loosely follows [Dive into Deep Learning](#) in terms of notebooks, slides and assignments

Assignments:

Assignments and a final project are a fundamental part of this course. Two assignments will be group projects which will involve a short (ten minute) presentation to the class. The final project will involve ongoing consideration throughout the semester and will be due on the day the final is scheduled.

Text:

Dive Into Deep Learning : <https://d2l.ai/>

Grading:

- Exams (2) 25%
- Assignments (4) 40%
- Final Project 15%
- Labs 10%
- Class Presentations/Writeups 10%

Any assignments handed in late will incur a 5% a day reduction in the assignment grade. Any students which choose to work together on an assignment must make a note of the fact on the top of the assignment. Failure to do so will result in no credit for the assignment and possible failure of the course.

Teamwork on Programs It is acceptable to work with other students in the analysis, design, and debugging phases of your programming assignments. However, unless it is a team project, do not write code as a team.

Do not copy your code from or for another student. . Please list the students with whom you collaborated, and the type of help you gave or received in a comment at the top of your program.

[Links to related material](#)

Reading, assignment, and exam schedule

August / September

8/31	Course Overview : Reading : Chapter 1, Introduction Lab : Jupyter Notebooks and installing software on your own machine
9/2	Data Manipulation, Linear Algebra Reading : Chapter 2 : Sections 2.1-2.3
9/7	Labor Day
9/9	Preliminaries : Calculus, Probability, and Automatic Differentiation Reading : Finish Chapter 2 Problem Set #1 Due
9/14	Linear Regression Reading : Chapter 3 : Sections 3.1-3.3 Lab : Linear Regression
9/16	Softmax Regression Reading : Finish Chapter 3
9/21	Multilayer Perceptrons Reading : Chapter 4 : Sections 4.1-4.4 Lab : Underfit, Overfit lab

	Extra credit/Graduate Students : Do exercises.
9/23	Multilayer Perceptrons Reading : Finish Chapter 4 Problem Set #2 Due
9/28	Deep Learning Computation Reading : Chapter 5.1, 5.2, 5.4-5.6 Lab : Follow instructions in Section 4.10 and make a submission to Kaggle. See how well you can do ... will have small class contest
9/30	Convolutional Neural Networks Reading : Chapter 6

October

10/5	Modern Convolutional Networks Reading : Chapter 7 : Sections 7.1-7.4 Lab : Convolutional Networks
10/7	Modern Convolutional Networks Reading : Finish Chapter 7 Problem Set #3 Due
10/12	Fall break
10/14	First Exam
10/19	Recurrent Neural Networks Reading : Chapter 8, Sections 8.1-8.4 Lab : Recurrent Neural Networks Lab : Recurrent Neural Networks or Fastai
10/21	Recurrent Neural Networks Reading : Finish Chapter 8
10/26	Midterm Project Report and Presentation Lab : Recurrent Neural Networks and/or Fastai
10/28	Modern Recurrent Neural Networks Reading : Chapter 9, Sections 9.1-9.4

November

11/2	Modern Recurrent Neural Networks Reading : Finish Chapter 9 Lab : Modern Recurrent Networks Problem Set #3 Due
11/4	Optimization Algorithms Reading : Chapter 11, Sections 11.1-11.3
11/9	Optimization Algorithms Reading : Chapter 11, Sections 11.4-11.6 Graduate students/Extra Credit : finish Chapter 11, provide summary

	Lab:
11/11	Veterans Day
11/16	Computer Vision Reading : Sections 13.1-13.4 Lab :
11/18	Bias, Deployment issues Problem Set #4 Due
11/23	Second Exam
11/25	Thanksgiving break

December

12/2	Project time ! Optional class, discussions about project topics
12/7	Project time ! Optional class, discussions about project topics No formal lab (available for project help)
12/9	Final Project Presentations
12/11	Final Project Presentations
12/?	Final Project Due :