Special Topics: Deep Learning COMP 499/691

Winter 2021

Instructor:	Eugene Belilovsky	**Time:**	M 17:45 – 20:15
Email:	eugene.belilovsky@concordia.ca	**Place:**	Zoom Live Session

Note: This syllabus is subject to change and any changes will be posted in the Announcements section of your Moodle portal.

Teaching Assistants (TA):
Ali Pourganjalikhan - apourganjalikhan@gmail.com – Monday Lab Section
Soroush Saryazdi - soroush96@gmail.com – Tuesday Lab Section

Office hours: Please email questions about the course to the instructor or post in the Moodle forum. Questions about the labs and grading of labs to the TAs.

Text Book: The course textbook will be **Deep Learning** by Ian Goodfellow, Yoshua Bengio and Aaron Courville freely available at www.deeplearningbook.org

Objectives: This course is primarily designed for graduate students and advance undergraduates. By the end of the course students will have an in-depth knowledge on currently popular Deep Learning methods and paradigms, practical experience in applying them, and familiarity with some of the research frontiers and emerging trends.

Prerequisites: An undergraduate-level understanding of linear algebra, probability, statistics, algorithms, and machine learning is assumed. Furthermore, particularly for students who have not completed Comp 432, prior experience with python and various scientific computing packages like numpy is expected.

Course Content:

Jan 18 - Introduction, Definitions, Universal Approx, Depth
Jan 25 - Backpropagation and AD software, Introduction to Pytorch
Feb 1 - Optimization for Deep Learning
Feb 8 - Regularization and Implicit Regularization Methods
Feb 15 - CNNs and Visual Representation Learning
Feb 22 - Interpertability of DNN/CNNs (Guest Lecture)
March 1 - Generalization and Adversarial examples
March 8 - RNNs, Sequence models, Seq2Seq
March 15 - Attention and Self-Attention
March 22 - Multi-task and Transfer Learning
March 29 - Deep Generative Models
April 12 - Deep Metric Learning
April 19 - Self-Supervised Learning
April 21 - Deep Reinforcement Learning Primer (Time Permitting)

Grading Policy:

Assignments (45%)

- 3 Problem sets distributed throughout the semester

- Written Questions (30%) and Programming Assignments (70%)

Project: (30%)

- Teams of 2-3 students will work on a Kaggle-style problem and competition

- Grade will be mix of report (75%) describing methods tried and overall performance on tasks (25%)

- Graduate student sections reports will be graded more heavily on originality and extensive literature review

Quizzes: (15%)

- 3-4 in-class Quizzes

- 30 minutes with multiple choice and fill-in the blank questions

Labs: (10%)

- Labs based on Jupyter notebooks which may be done in Google Colab to be submitted each week

Key dates (Subject to Change):

- Quizzes - Feb 15, March 22, April 19

- Assignment due dates will be announced later

- Project will be assigned by mid-February and due shortly after the last day of class

- Labs will be posted by Monday morning each week and due the following Monday

Academic Honesty: Maximum possible penalties for violations of the academic honesty policy will be applied.