Applied Machine Learning

Syllabus and logistics

Siamak Ravanbakhsh

COMP 551 **(winter 2020)**

Sections

Section one: Tuesday & Thursday, 11:30 am - 12:55 pm

Location: Strathcona Anatomy & Dentistry M-1

Instructor: Reihaneh Rabbany <rrabba@cs.mcgill.ca>

Office hours: Thursday, 1:30 pm - 2:30 pm @ MC 232

Website: http://www.reirab.com/comp55120.html

Section two: Tuesday & Thursday, 4:30 pm - 5:30 pm

Location: Maass Chemistry Building 10

Instructor: Siamak Ravanbakhsh <siamak@cs.mcgill.ca>

Office hours: Wednesdays 4:30 pm-5:30 pm, ENGMC 325

Website: https://www.cs.mcgill.ca/~siamak/COMP551/index.html

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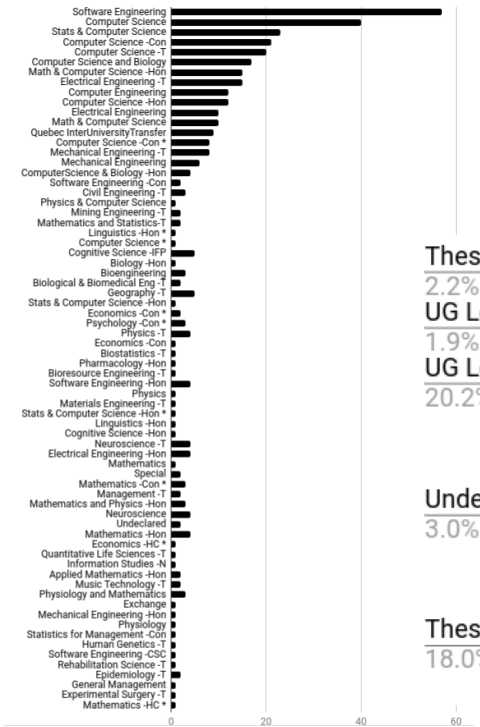
Teaching Assistants

Name	Contact {@mail.mcgill.ca}	Office hours
Jin Dong	jin.dong	TBD
Yanlin Zhang	yanlin.zhang2	TBD
Haque Ishfaq	haque.ishfaq	TBD
Martin Klissarov	martin.klissarov	TBD
Kian Ahrabian	kian.ahrabian	TBD
Arnab Kumar Mondal	arnab.mondal	TBD
Samin Yeasar Arnob	samin.arnob	TBD
Tianzi Yang	tianzi.yang	TBD
Zhilong Chen	zhilong.chen	TBD
David Venuto	david.venuto	TBD

FAQ

- Will there be **recordings**? No, but you can refer to the slides and assigned readings
- Will the **two sections** offer the same materials? That is the plan and assignments and mid-term will be jointly held, **but** the materials might or might not be covered in the same order, depth or pace.

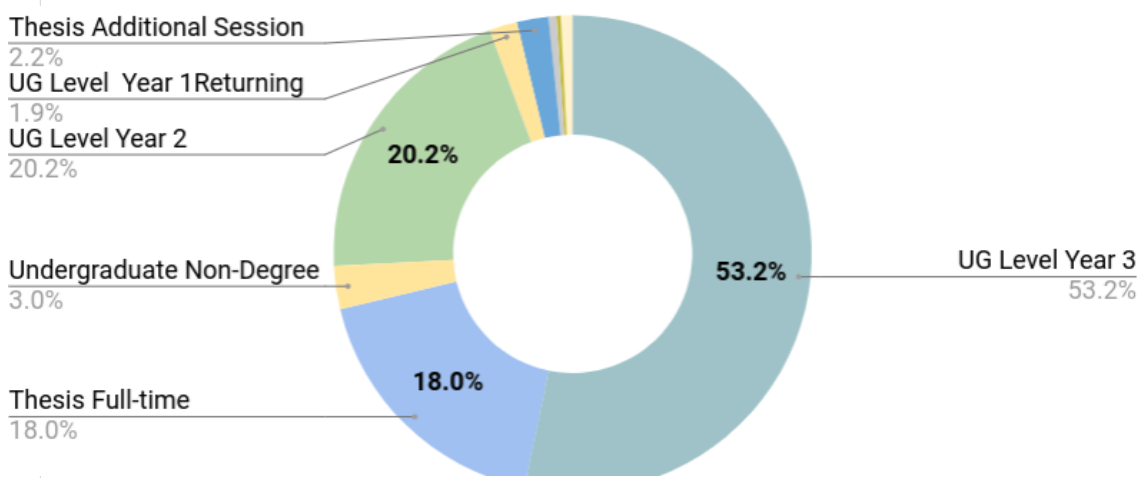
About you!



399 registered

mostly undergraduates year 3

most have CS or CE background



About me

Siamak Ravanbakhsh (pronounced almost like see-a-Mac)

- Assistant Professor in the School of Computer Science
- Canada CIFAR AI Chair and core member at Mila

research interest: representation learning

0

- what is the right representation for an AI agent?

background in two approaches to this problem

- using probabilistic graphical models

I also collaborate with physicists and cosmologists

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- what is the right representation for an AI agent?
- how do we learn quickly from data and perform inference

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- using probabilistic graphical models
- using invariances and symmetries

I also collaborate with physicists and cosmologists

About them (TAs)

Name	
Jin Dong	graph representation and NLP at Mila
Yanlin Zhang	computational biology
Haque Ishfaq	RL theory and bandits
Martin Klissarov	RL
Kian Ahrabian	software engineering and machine learning
Arnab Kumar Mondal	
Samin Yeasar Arnob	
Tianzi Yang	DL on computer vision and network
Zhilong Chen	
David Venuto	Deep RL at Mila

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About this course

Knowledge

Lectures

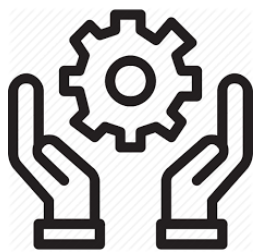
Weekly Quizzes

Midterm

Skills

Hands-on Tutorials [optional]

Mini-projects



About this course

complementary components

Understand the theory behind learning algorithms

Practice applying them in real-world

About this course

evaluation and grading

Weekly quizzes - **15%** {online on Mondays}
Midterm examination - **35%** {written}

Mini-projects - **50%** {group assignments}

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evaluation and grading

Weekly quizzes - **15%** {online on Mondays}

Midterm examination - **35%** {written}

March 30th 18:05-20:55

Let us know immidetly if you can not attend

Mini-projects - **50%** {group assignments}

Late submissions

- All due dates are **11:59 pm** in Montreal unless stated otherwise.
- **No make-up quizzes** will be given.

Prerequisites

- Python programming skills
- probability theory
- linear algebra
- calculus

Tutorials

{tentative and subject to change, exact dates TBD}

1	mid Jan.	Python	https://www.python.org/
2	end of Jan.	Scikit-learn	https://scikit-learn.org/
3	end of Feb.	Pytorch	https://pytorch.org/

No plan on tutorials on math but please fill out this poll, to see if there is enough demand for organizing one

Course outline

This is very likely going to change during the semester

Introduction

- Syllabus and Introduction
- K-Nearest Neighbours and Some Basic Concepts

Classic Supervised Learning

- *Linear Regression*
- *Linear Classification*
- *Regularization, Bias-Variance*
- *Gradient Descent*
- *Support Vector Machines and Kernels*
- *Decision Trees*
- *Ensembles*

Deep Learning

- *Multilayer Perceptron*
- *Backpropagation*
- *Convolutional Neural Networks*
- *Recurrent Neural Networks*

Unsupervised Learning

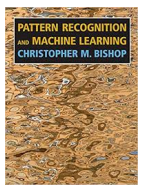
- *Dimensionality Reduction*
- *Clustering*

Bayesian Inference

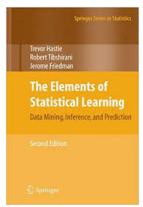
- *Bayesian Decision Theory*
- *Conjugate Priors*
- *Bayesian Linear Regression*

Relevant Textbooks

No required textbook but slides will cover chapters from the following books, all available online, which can be used as reference materials.

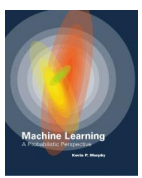


[Bishop] Pattern Recognition and Machine Learning by Christopher Bishop (2007)

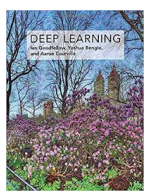


[HTF] The Elements of Statistical Learning: Data Mining, Inference, and Prediction

(2009) by Trevor Hastie, Robert Tibshirani and Jerome Friedman



[Murphy] Machine Learning: A Probabilistic Perspective by Kevin Murphy (2012),



[GBC] Deep Learning (2016) by Ian Goodfellow, Yoshua Bengio, and Aaron Courville

Two pointers

Course website

https://www.cs.mcgill.ca/~siamak/COMP551/index.html

MyCourses

to check for announcements, form groups for projects, submit weekly quizzes, grades, discussions

https://mycourses2.mcgill.ca/d2l/home/432032