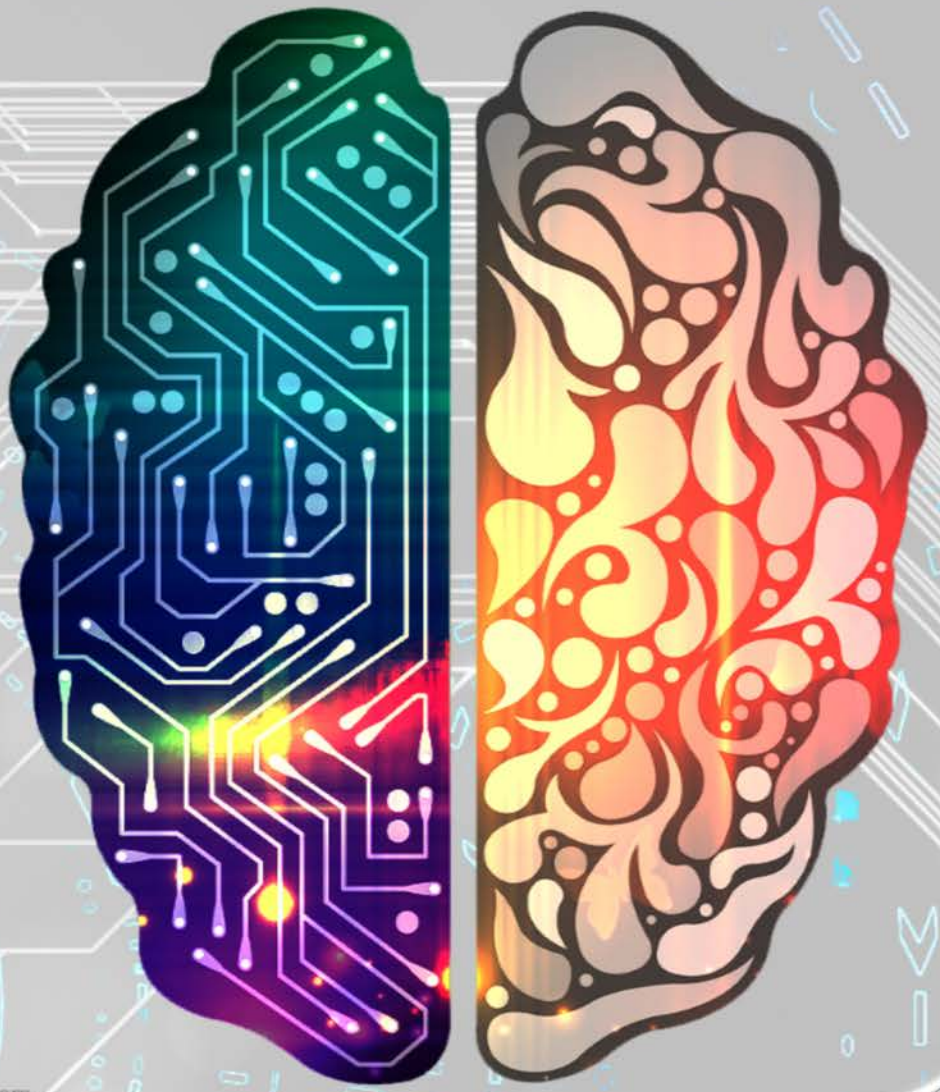
جامعة قطر
QATAR UNIVERSITY

CMPS 460 – Spring 2022

MACHINE LEARNING

Tamer Elsayed



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Admistrivia

Schedule (L01)

Day	Time	Activity	Room
Sun-Tue-Thr	12:00pm-12:50pm	Class	B05-0237
TBD	TBD	Office Hour	My office

- Other times are available by **appointment**
- Best way to contact me is by email

Schedule (L51)

Day	Time	Activity	Room
Sun-Tue-Thr	1:00pm-1:50pm	Class	C11-0112
TBD	TBD	Office Hour	TBD

- Other times are available by **appointment**
- Best way to contact me is by email

PLEASE …

While in class!

- Phones, etc.
  - Vibrate or off
  - Do not use during class
    - no texting, no tweeting, no updating your status, …
- Computers
  - Okay to take notes or give presentations
  - Okay to look up stuff related to class ***when asked to***
  - **Nothing else**
- Other devices
  - Same basic idea

Class page on Blackboard

- Planning to use it extensively!
- Syllabus (tentative)
- Announcements
- Slides
- **Resources**
- Videos
- Assignments
- Handouts
- Due dates

Prerequisites

- No ML/DM/IR/BD background is assumed/required
- Calculus, linear algebra, probability
  - review resources provided
- Python Programming
  - if not, you will pick it up quickly (resources provided)

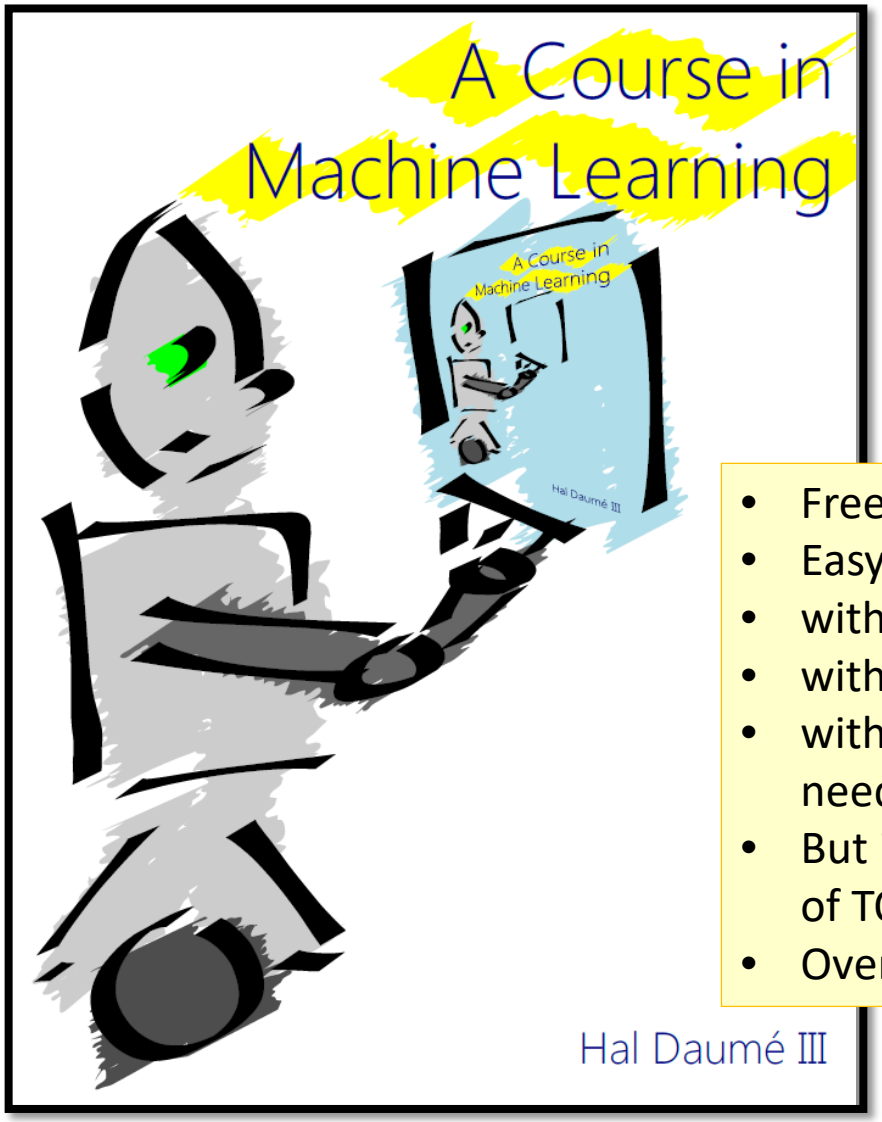
Course Goals

- Broad overview of existing methods for machine learning and an introduction to adaptive systems in general.

- By the end of the semester, you should be able to
  - Look at a problem
  - Identify if ML is an appropriate solution
  - If so, identify what types of algorithms might be applicable
  - Apply those algorithms

- This course is **not**
  - A survey of ML algorithms
  - A tutorial on ML frameworks such as TensorFlow, PyTorch…

Textbook



http://ciml.info/

- Free!
- Easy to read
- with examples
- with pseudo code
- with math review whenever needed
- But it's still in progress! (lots of TODOs, etc.)
- Overall, it's a great book!

Topics

- **Foundations of Supervised Learning**
  - Decision trees and inductive bias
  - Geometry and nearest neighbors
  - Perceptron
  - Practical concerns: feature design, evaluation, debugging
  - Multiclass classification

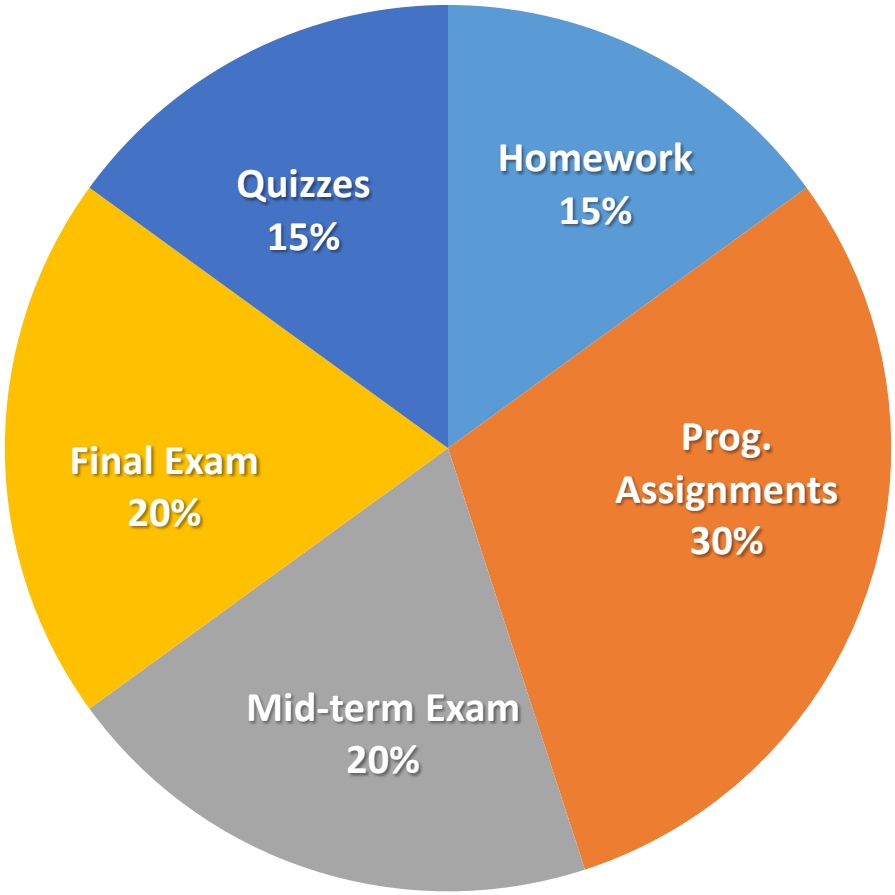
- **Advanced Supervised Learning**
  - Linear models and gradient descent
  - Support Vector Machines & Kernels
  - Naive Bayes models and probabilistic modeling
  - Neural networks (& Deep Learning)

Topics

- **Unsupervised learning**
  - K-means
  - PCA

- **Selected advanced topics (as time permits)**
  - Ensemble methods
  - Expectation maximization
  - Intro to reinforcement learning

Grade Distribution (tentative)



Grade Distribution

- **Homework: 15%**
  - 4-5
  - for individuals
- **Quizzes: 15%**
  - 4, best 3, no makeup
- **Programming Assignments: 30%**
  - 3 assignments
  - In teams of 2
  - in Python
- **Exams: 40%**
  - Mid-Term Exam: 20%
  - Final Exam: 20%
    - Not cumulative
  - Both are closed book (with 1 page cheat-sheet)

What I expect from you

- Work hard!
- Review your math (calculus, linear algebra, probability)
- Do a fair amount of programming
- Attend the lectures
  - Interact in class: ask and answer questions, take notes if necessary
  - Come to class prepared
  - Do the required readings **before** class
- Complete HW independently & complete Programming Assignments collaboratively with your mate.
  - Plan your time ahead!
  - Start from day 1
  - Don’t wait to the last minute for submissions

Plagiarism

is a VERY SERIOUS matter!

Honesty

- Copying from each other OR from external sources **IS <u>CHEATING</u>**
- If happened in **<u>one</u>** problem or part, you will get **<u>ZERO</u>** in the **<u>entire</u>** homework or project!
  - **Both cheater & cheated-from will get ZERO!**
- Assignments for **individuals** are assignments for **individuals, not teams!**
- Handed-in work *must be* ***<u>your own</u>***
  - Do not copy, do not let someone read your work
- Plagiarism and other forms of cheating will result in an **F**

And more importantly …

قال رسول الله صلى الله عليه وسلم

"من غش فليس منا"

Whoever deceives,
he/she is not one of us (any more)

I wish that you …

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Ready?