CSCI 416/516: Introduction to Machine Learning
Section 03 — Fall 2024

Instructor Information

Name: Ashley Gao
Office: McGlothlin-Street Hall Room 004
Email: ygao18@wm.edu
Office Hours: M/W: 12:00-13:30, and by Appointment

Class Information

Dates: August 28, 2024 - December 17, 2024
Time: M/W: 14:00-15:20
Classroom: Blow Memorial Hall 332
Website: https://lindagaw.github.io/courses/CSCI416-Fall24/CSCI416.html

Course Description

Machine learning (ML) is a set of techniques that allow computers to learn from data and experience, rather than requiring humans to specify the desired behavior by hand. ML has become increasingly central both in AI as an academic field, and in industry. This course provides a broad introduction to some of the most commonly used ML algorithms. It also serves to introduce key algorithmic principles which will serve as a foundation for more advanced courses, such as Deep Learning.

Grading

The course grade is determined by the following components:

Homework #1	10%
Homework #2	10%
Homework #3	10%
Homework #4	10%
Midterm	20%
Final Project	20%
Final Exam	20%

Grade Scale

Final grades will be assigned according to the following scale. Grades may be curved at the instructor's discretion.

A >= 93% > A- >= 90% > B+ >= 87% > B >= 83% > B- >= 80% > C+ >= 77% > C >= 73% > C- >= 70% > D+ >= 67% > D >= 65% > D- >= 60% > F.

Textbook

There is no required textbook for this class.

Important Dates

- First day of classes; Add/drop period begins: August 27
- Last day to add/drop: September 9
- Fall Break: October 10-13
- Academic Withdrawal Deadline: October 28
- Final Exam: December 12 (14:00 - 17:00)

Graduate/Undergraduate Expectations

The graduate students (enrolled in CSCI 516) are expected to complete additional coursework, compared to undergraduate students (enrolled in CSCI 416). Specifically, each homework features additional in-depth questions for graduate students that explore the homework subject in greater depth and that require additional independent reading of current research papers on the topic beyond the material covered in class. Students are expected to show an advanced understanding of the subject and the ability to master new material on the subject. This is an extra learning outcome for the graduate students. These additional questions constitute 25% - 30% of the marks for homeworks. Undergraduate students are encouraged to attempt these questions for extra credit.

Learning Outcomes

- (416/516) Understanding foundational principles and algorithms in machine learning.
- (416/516) Gaining proficiency in model selection, training, and evaluation.
- (416/516) Applying machine learning techniques to real-world datasets and problems.
- (416/516) Critically analyzing the ethical implications of machine learning applications.
- (516) Engaging with current research trends and challenges in the field.

***Tentative* Schedule**

Week #	Dates	Topic
0	Aug 28	Logistics & Teaser
1	Sep 2, Sep 4	Linear Regression
2	Sep 9, Sep 11	Optimization
3	Sep 16, Sep 18	Logistic Regression, Multiclass Classification
4	Sep 23, Sep 25	Support Vector Machines
5	Sep 30, Oct 2	Kernels
6	Oct 7, Oct 9	Decision Trees
7	Oct 14, Oct 16	Midterm Prep & Midterm Exam
8	Oct 21, Oct 23	Boosting & Ensemble Learning
9	Oct 28, Oct 30	Multilayer Perceptrons
10	Nov 4, Nov 6	Optimization in MLP
11	Nov 11, Nov 13	Convolutional Neural Networks
12	Nov 18, Nov 20	Recurrent Neural Networks
13	Nov 25, Nov 27	RNN & Variations
14	Dec 2, Dec 4	Attention & Transformers
15	Dec 9, Dec 11	Final Exam Preparation

This schedule is tentative and subject to change as the course progresses.

Exams

- Exams will be closed-book but you are allowed **a one-sided, US letter sized cheat sheet**. Focus will be placed on material introduced during the lecture. More details will be provided during the semester.
- Missed exams will get a score of 0 except in the case of a valid medical reason or prior approval by the instructors.

Submission and Late Policy

- There will be 4 homework and 1 final project in this course. The assignments will be released on the course webpage. The assignments will be collected on Blackboard. They are due at 23:59 (11:59 pm) at the due dates announced on the course website.
- We encourage typesetting using LaTeX, but scans of handwritten solutions are also acceptable as long as they are legible.
- Assignments will be accepted up to 3 days late, but 10% will be deducted for each day late, rounded up to the nearest day. No credit will be given for assignments submitted after 3 day. Extensions will be granted only in special situations with valid proof (e.g. Doctor's note).

Academic Integrity

Presenting someone else's ideas as your own, either verbatim or recast in your own words – is a

serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in our campus policies. Please read the Honor Code at William and Mary. **If you violate this rule, you will receive an F as the final grade and be referred to the Honor's Council.**

When you refer to some source codes on GitHub, please cite them with a URL in your report. Please do not copy the answers from the Internet directly without any references. You should rephrase your answers based on your own understanding.

Accomodations

William & Mary accommodates students with disabilities in accordance with federal laws and university policy. Any student who feels they may need an accommodation based on the impact of a learning, psychiatric, physical, or chronic health diagnosis should contact Student Accessibility Services staff at 757-221-2512 or at sas@wm.edu to determine if accommodations are warranted and to obtain an official letter of accommodation. For more information, please see www.wm.edu/sas.

As per the university's guidance, if you have a religious observance that conflicts with a deadline, please notify me as soon as possible so that I can attempt to make an appropriate adjustment.