

Applied Machine Learning

COSC 410
Section and Lab A

Instructor Info —



Forrest Davis (he/him)



T: 3:30-5:30PM, R: 1:30-2:30PM



Bernstein 322



fdavis@colgate.edu

Course Info —



Class: T, R | Lab: W



8:30-9:45AM | 9:20-11:10AM



212 Bernstein | 114 Bernstein

Overview

This course provides a practical introduction to applied machine learning. Students engage in supervised and unsupervised machine learning algorithms, including regression, support vector machines, decision trees, nearest neighbors, clustering, and ensemble methods. Students also learn deep learning techniques, including feedforward, convolutional, and recurrent neural networks. Emphasis is placed on understanding and gaining hands-on experience with machine learning for practical use.

Material

Required Text: Dive into Deep Learning by Aston Zhang, Zachary C. Lipton, Mu Li, and Alexander J. Smola. It is available online here.

Course Website: You can find the course website where course materials, codelets, and labs will be posted here.

Moodle Site: The course and lab Moodle site is here.

Schedule of Topics: A dynamic schedule of topics for this course can be found here.

Coursework

Codelets

Codelets are smaller assignments centered around a central problem, skill, or type of task, building on the course materials. There will be roughly 10 codelets graded on a **satisfactory/unsatisfactory basis**, where **satisfactory** demonstrates you meet the expectations of the codelet (roughly an 85% in standard grading). Note: you might be requested to orally explain your answers to me to validate your assessment.

Labs

Lab assignments apply and extend the concepts from class. There will be around 9 labs throughout the semester. They are graded on a **satisfactory/unsatisfactory basis**, where **satisfactory** demonstrates you meet the expectations of the labs (roughly an 85% in standard grading). Note: you might be requested to orally explain your answers to me to validate your assessment.

Exams

The exams are designed to test your understanding of the core concepts covered in class, and your ability to apply them in different contexts. They will not involve any programming component. The scope of each exam is indicated on the course schedule. The exams will happen during the lab section. **No discussion of exam questions or possible solutions is permitted from the time the exam is first administered until exams have been completed by all students and returned.**

- Midterm Exam 1: February 19
- Midterm Exam 2: April 16

Please let me know in advance if you will be unable to take one of the exams on the scheduled date.

Capstone Project

A core component of the course is the completion of a capstone project completed in a small team (no more than 3 people) and related to machine learning. There are 6 components of the capstone project:

- Proposal (Monday, March 31)
- Feedback Discussions (Thursday, April 3)
- Project Milestone (Friday, April 11)
- Preliminary Presentation (Thursday, April 24)
- Poster Presentation Gala (TBD)
- Final artifact (Monday, May 5)

Completion of the proposal, feedback discussion meeting, and preliminary presentation are graded on a **satisfactory/unsatisfactory basis**.

Grading Scheme

Your course grade is based on your codelets, exams, and capstone project. The table below defines specific criteria for each letter grade. A plus (+) or minus (-) will be added to your grade based on your attendance and completion of a society reflection. You must regularly attend class and complete the reflection for a plus (+). A minus (-) will be added to your grade if you fail to regularly attend and fail to complete the reflection.

	Graded S/U S: >= 85	Graded traditionally	Graded traditionally
	Codelets	Exams (2)	Capstone
A	10/10	> 90% avg	> 90% avg and 3/3 S
B	8/10	80-89% avg	80-89% avg and 3/3 S
C	6/10	70-79% avg	70-79% avg and 2/3 S
D	4/10	60-69% avg	60-69% avg and 1/3 S
F	Failure to meet expectations for D results in an F		

The lab grade is based on lab assignments and attendance. The table below defines specific criteria.

	Graded S/U S: >= 85	Attendance
	Labs	Exams (2)
A	8/9	0 unexcused absences
B	7/9	1 unexcused absences
C	6/9	2 unexcused absences
D	5/9	>2 unexcused absences
F	Failure to meet expectations for D results in an F	

The final letter grade is determined by the criterion satisfied by all components. A grade of A+ is awarded when the student demonstrates truly exceptional performance and is not simply determined by having a high final grade. I reserve the right to make adjustments; any such adjustments will only raise your grade, never lower it.

Policies

Attendance and Engagement

Attendance to class is expected and contributes to your final grade. However, I do not expect you to attend if you are feeling unwell. Additionally, if you have athletics, scheduled commitments, or other issues please let me know. If you miss a class, you can make up the credit by performing a **check-in** email. For a check-in, consult with a classmate and/or review the materials, and **within 48 hours** of the class send me an email containing:

1. a brief summary (2-4 sentences) of what was covered
2. any thoughts/questions you have

Check-ins are not a substitute for attending class regularly. While in the class, you are expected to engage with the material and the other students in the course. You should aim to be a **good participant**: raising your hand, respecting others, actively listening, and making sure to leave space for others to speak. There are no bad questions, and I would always rather you contribute than avoid doing so.

Deadlines

I will be reasonably flexible on deadlines. If you need some extra time due to illness, your workload in other classes, and/or personal matters, please let me know. As long as you have made a good faith effort to complete learning activities by the original deadline, I am willing to offer a reasonable extension. I will be less willing to grant an extension if you wait to start a assignment until the day before it is due (when you've had a week to work on it), repeatedly ask for extensions, etc.

Any assignment that is turned in late without prior approval will be marked as unsatisfactory.

Amnesty Submissions

On gradescope, you will find two amnesty submissions assignments. This is a place for codelets that are handed in beyond whatever deadline that has been set (or that we have established) or codelets you would like to improve on. You may submit up to two codelets during the semester. Each submission should be accompanied by a pdf describing how your code works, and if applicable, what was wrong with your original code and how you fixed the problems. Your grade on these assignments is contingent on a satisfactory explanation. Note, I will not grade these in a timely manner and no extension for submission will be extended beyond 5PM on the last day of class (May 2).

Academic Honesty & Collaboration

You are expected to abide by Colgate's academic honor code. Beyond the discussions that happen in the lab section, you are not allowed to discuss the specifics of the assignments or share your code with other students in any of the sections of this class.

Collaborating with peers in the class

You may discuss course concepts, generic aspects of python, and work through the logic of something you don't understand with your peers. However, you should not share code (including psuedo code). Your submitted work should be your own. Here are some concrete rules that exemplify this (but are not intended to be comprehensive):

Do NOT:

- Ask a peer in either section of the course to debug your code.
- Ask a peer for pseudo code for an algorithm needed for a homework.

You CAN:

- Ask clarification questions about the fundamentals of programming (e.g., "How do I create a class in Python?")
- Ask for conceptual clarifications (e.g., "What is the difference between regression and classification?")
- Try to work through the logic of something you don't understand (e.g., "How is data formatted for a neural network?")

Using generative AI tools

Generative AI systems (e.g., ChatGPT), if used correctly, can serve as powerful tools for learning and idea refinement. In this course, you can use generative AI systems to learn about concepts iteratively through a interaction. However, you cannot ask these systems to directly give you answers or write code for you. That is, you should submit your **own work**. Here are some concrete rules that exemplify this (but are not intended to be comprehensive):

Do NOT:

- Give the model a problem description and ask it to sketch an algorithm for you or write you pseudo code.
- Give the model the homework description and ask it to organize the code for you (e.g., generate the necessary function headers, write the main functions etc).
- Give the model a function description and ask it to generate code for you.
- Interact with the model and have your assignment open at the same time. Use your interaction with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge

Using the AI system in ways as described above will count as **cheating** even if you cite the AI system as a source.

You CAN:

- Ask clarification questions about the fundamentals of programming (e.g., “When should I use a public vs. private method in Java?”)
- Ask for conceptual clarifications (e.g., “What is the difference between recall, precision and AUC?”)
- Try to work through the logic of something you don’t understand (e.g., “How does the gradient tell the model which direction to move in during optimization?”)
- Given a problem description and your proposed algorithm and ‘talk’ through the potential fallacies.

Remember: Policies around the use of Generative AI tools, like any other course policies, vary across different courses both within and outside the department.

Adjustments

If there is anything that may affect your learning in this class, please contact me so appropriate arrangements can be made. Information you share will be kept confidential (to the extent allowed by university policy).

Anonymous Feedback

Your feedback on this course is important for helping me improve the learning environment. You can provide anonymous feedback at any point in the semester via this form.

Getting Help

A key to your success at Colgate is figuring out what resources are available and using them to help you achieve your goals. There are several options for getting help with this course:

1. Drop in during my office hours (noted at the top of the syllabus) or if no office hours times work, arrange an appointment with me – just send me an email with a few times you are available, and we will find a time that works well for both of us.
2. Form a study group with other students in the class and work together on a regular basis (note the Academic Honesty & Collaboration policy above).
3. Attend Open Lab hours Sundays through Thursdays 7:00-10:00pm in McGregory 329. CS tutors are available to provide hands-on help with coursework.

I also encourage you to reach out to many great resources at Colgate that can assist you with academic, personal, or other needs, including:

- **Administrative Deans** (<https://www.colgate.edu/about/offices-centers-institutes/dean-college/administrative-advising>) help you understand policies and procedures, navigate personal challenges, work with faculty, and engage with parents.
- **Counseling Center** (<https://colgate.edu/counseling>) staff are trained to help students manage a wide array of emotions. The counseling center meets with over half the student body for clinical services at some point during their four years at Colgate. You can arrange an appointment online or by phone (315-228-7385). For emergencies, a counselor is available 24/7 by calling campus safety at 315-228-7333 and asking for the counselor on call.
- **Haven** (<https://colgate.edu/haven>) is a sexual violence response center that provides confidential care, support, advocacy, and trauma-informed clinical services for survivors of sexual assault, intimate partner violence, child/family abuse, stalking, and/or harassment. You can call (315-228-7385) or visit during business hours. You can also contact the Help Restore Hope Center (855-966-9723).
- **Student Health Services** (<https://colgate.edu/offices-and-services/studenthealthservice>) provides accessible, convenient, cost-effective, non-judgmental, and confidential care for all students.
- **Information Technology Services** (<https://colgate.edu/its>) help desk consultants assist all students with problems concerning email, Portal, Moodle, or your personal laptop. Contact me if problems with your personal computer are affecting your ability to get your work done.
- **Chaplains** (<https://colgate.edu/campus-life/religious-life/officeofthechaplains>) provide the community with a dynamic, friendly, and supportive place in which to seek answers to life’s biggest questions.