Syllabus

CS 251: Data Analysis and Visualization

An introduction to the analysis and visualization of scientific data. Topics include data management, basic statistical analysis, data mining techniques, and fundamental concepts of machine learning. Students also learn how to visualize different types of data, focusing on discovering patterns and relationships. Through programming projects, students gain hands-on experience analyzing and selecting appropriate visualizations for real datasets.

CS 252: Mathematical Data Analysis and Visualization

Emphasis is placed on the mathematical basis of algorithms, which are then applied to real datasets. As time allows, additional techniques involving linear algebra and calculus are covered.

Semester	Spring 2023		
Lecture Times & Locations	**Section**		
	CS 251 A	MWF 9:00am - 9:50am	Lovejoy 100
	CS 251 B	MWF 10:00am - 10:50am	Diamond 122
	CS 251 C	MWF 11:00am - 11:50am	Diamond 122
	CS 252	MWF 11:00am - 11:50am	Miller 008
Lab (Davis 122) Times	Mon 1:00pm - 2:20pm	Tues 1:00pm - 2:20pm	Wed 1:00pm - 2:20pm	Thurs 1:00pm - 2:20pm
	Mon 2:30pm - 3:50pm		Wed 2:30pm - 3:50pm	

Instructors			
	Stephanie R. Taylor (https://cs.colby.edu/srtaylor/)	**Amanda Stent (https://amandastent.net/)**	**Oliver Layton (https://sites.google.com/colby.edu/owlab)**
	Email: stephanie.taylor@colby.edu (mailto:stephanie.taylor@colby.edu)	**Email**: ajstent@colby.edu (mailto:ajstent@colby.edu)	**Email**: oliver.layton@colby.edu (mailto:oliver.layon@colby.edu)
	Sections: CS 251 A and B	**Sections**: CS 251 C	**Sections**: CS 252

We are available to help outside of class time, please do not hesitate to come to office hours or send us an email. We try our best to get back to you within the day. Not only do we enjoy talking about computer science, we want to get to know you!

	Office hours (in person):
	   M 4-5pm
	   W 4-5pm
	 Note: Please feel free to drop in to any CS25X lab for help. I need to prioritize students registered for the lab, but answering questions for additional students is the only way I am going to be able to help enough students this semester. I have such a packed schedule that my office hours are fewer than in the past.
	 Note: I often need to change my office hours to accommodate meetings.
	 Check the image of my calendar (https://cs.colby.edu/srtaylor/) each week for updates.
	 Remote via Zoom
	 By appointment, with a preference for Wednesday night 8-10pm
		Office hours:
		 Mondays, 1-4; Wednesdays, 1-2 and 3-4
		 Note: I am also available by appointment, including for Zoom meetings; see my Calendly (https://calendly.com/amandastentcolby)
			Office hours:
			 M 1-3pm
			 W 1-3pm
			 R 3:45-4:45pm

	Office: Davis 112	**Office**: Olin 136	**Office**: Davis 115

Lab instructor	**Stephanie Taylor (http://www.cs.colby.edu/srtaylor)** **Email**: stephanie.taylor@colby.edu (mailto:stephanie.taylor@colby.edu) Note: In addition to attending the lab section for which you are registered, CS251 and CS252 students are welcome to attend any lab sessions if there is space in the room.

	Day & Time	TA	Email

Evening TAs — In order to provide as much help as possible to you as you work on assignments in this course, the CS Department has hired the following former CS251ers to work as TAs in Davis 122 in the evenings. You are strongly encouraged to take advantage of this resource. The TAs are getting paid to help you, so don't feel guilty about asking them for help!

Day & Time	TA	Email
Sunday, 4:00 - 7:00 PM	Laura Drepanos	lmdrep23@colby.edu
Sunnday, 7:00 - 10:00 PM	Samuel Munoz, Nico Hillison, Luis Baez	smunoz23@colby.edu, nmhill23@colby.edu, lmbaez23@colby.edu
Monday, 4:00 - 7:00 PM	Izzy Hurley	imhurl23@colby.edu
Monday, 7:00 - 10:00 PM	Isabella Feng, Benjamin Raivel, Grady Florance	yfeng23@colby.edu, bjraiv23@colby.edu, gtflor24@colby.edu
Tuesday, 4:00 - 7:00 PM	Anna Chen	anchen23@colby.edu
Tuesday, 7:00 - 10:00 PM	Nida Fatima, Yeeun Kang, Isabella Feng, Rosie Ingmann, Laura Drepanos	nfatim24@colby.edu, ykang23@colby.edu, yfeng23@colby.edu, ringma23@colby.edu, lmdrep23@colby.edu
Wednesday, 4:00 - 7:00 PM	Benjamin Raivel	bjraiv23@colby.edu
Wednesday, 7:00 - 10:00 PM	Ashley Ren, Blitzen Wang, Laura Drepanos, Jue Wang	yren24@colby.edu, jiwang24@colby.edu, lmdrep23@colby.edu, juwang24@colby.edu

Masking — Health and wellness are crucial to learn most effectively and produce the best quality work in this class. To serve these goals and minimize illness-related "downtime" for as many people as possible:

CS 251A and B	CS 251C	CS 252
If you have symptoms of a communicable respiratory disease (e.g. a cold or COVID), please wear a mask or stay home.	**masks will be required for at least the first week of class following any break.** I will distribute masks on the first day of class.	**masks will be required in class.** I will distribute masks on the first day of class.

Course Goals

A. Students understand and can write programs to efficiently store and manipulate real data.

B. Students understand to how to select appropriate visualizations for common types of data. The visualizations are well-labeled and integrated with text describing what is shown.

C. Students understand and can implement fundamental data analysis and machine learning algorithms.

D. Students understand and can use machine learning techniques for prediction and knowledge discovery.

E. Students present methods, algorithms, results, and designs in an organized and competently written manner.

Grading

There will be regular opportunities for you to practice what you have learned and to demonstrate your accomplishments.

The course grade will be determined as follows:

CS 251: Data Analysis and Visualization

Projects	50%	Hands-on opportunities to implement and explore concepts from lecture. Assigned on average every 2 weeks.
Quizzes	20%	Short weekly quizzes (given most Fridays)
Participation	10%	I expect you to be an active contributor in the classroom.
Final Exam	10%	An opportunity at the end of the semester to demonstrate your ability to answer questions about course material.
Short weekly assignments	10%	Work out practice problems on worksheets or homework. Graded in a binary fashion.

CS 252: Mathematical Data Analysis and Visualization

Projects	55%	Hands-on opportunities to implement and explore concepts from lecture. Assigned on average every 2 weeks.
Quizzes	20%	Short weekly quizzes (given most Fridays)
Participation	10%	I expect you to be an active contributor in the classroom.
Final Exam	15%	An opportunity at the end of the semester to demonstrate your ability to answer questions about course material.

Projects

Projects are assigned in class. There are two types of deadlines:

Check-in submissions	Final submissions
Your progress is check on designated project tasks (specifics are not graded).	Updated version of check-in submission and remaining project tasks, graded out of 30 points.
Honest attempt: possible to earn at least 26/30 on the final submission.	26/30: All tasks completed, all test code returns expected outputs.
Absent: 1 point reduction for each missing check-in on final submission.	26+: All tasks completed along with creative explorations beyond the scope of core tasks (extensions).

Your check-in and final submissions should be turned in on Google Classroom (https://classroom.google.com) your instructor will provide information about how.

Projects Deadlines

If your lab is on **Monday** or **Tuesday**, then check-in and projects are due on **Mondays** 11:59 pm EST.
If your lab is on **Wednesday** or **Thursday**, then check-in and projects are due on **Wednesdays** 11:59 pm EST.

One Week Project Late Policy

Projects are an important part of the learning experience in this course. We do not want you to get behind with the project workload. To encourage this, **projects later than 1 week past the due date will not be accepted**.

Late projects submitted within this 1 week grace period will not be eligible for extension credit and will be capped at a maximum of 26/30.

Please contact us immediately in the event of illness and other unforeseen circumstances, we will work out accommodations.

Project Freebee	Everyone gets **one** extended grade period to turn in a final or check-in project submission later than the due date. The freebee grants you additional time to work on extensions and have them graded or avoid the 1 point loss associated with a late check-in submission. To use the freebee, you must fill out the Freebee Google Form on Google Classroom **in advance of the due date**.
	Using a **freebee on Monday due dates** (you have lab M or T): you have until Friday 11:59pm of the same week to submit.
	Using a **freebee on Wednesday due dates** (you have lab W or R): you have until Sunday 11:59pm of the same week to submit.
Weekly quizzes	There will be a 10-15 minute quiz most Fridays. The quizzes let you show us what you have learned. These should be quick and straightforward if you participate in lecture and review lecture notes.
	We understand that everyone has a bad day; the quiz with the lowest grade will be dropped
	Each quiz may be made up when a prior request is made or there is a documented health issue. Please contact us immediately in the event of illness and other unforeseen circumstances, we will work out accommodations.
Short weekly assignments	Work out practice problems on worksheets or homework. Graded in a binary fashion: 1 if serious attempt made. 0 otherwise.

CS 251 A and B	CS 251 C
Given over Google Classroom on Wednesdays.	Given over Google Classroom on Wednesdays.
Due Thursday 11:59pm on Google Classroom.	**Due Thursday 11:59pm** on Google Classroom.

Class Participation	You are expected to attend every class and lab. If you must miss a class for any reason, **you must email us in advance.**
	For this course to be truly successful, your presence and participation is important. When you have a question, ask it. It is highly probable that one of your classmates has the same question.
Final Exam	There will be a final exam on **the final exam date, TBD** at **the final exam time, TBD**. You must be present at the exam, there are no make-ups.
Backups	It should go without saying that you should back up any files related to this course. If the code you submit to us is somehow lost (through your fault or our fault), we must be able to get another copy from you. We suggest you use **at least** the college's personal server (`filer.colby.edu`) and one other cloud-based storage service (e.g. Google Drive) to store your work in this class.

Collaboration, Academic Honesty	Computer science, both academically and professionally, is a collaborative discipline. In any collaboration, however, all parties are expected to make their own contributions and to generously credit the contributions of others. In our class, therefore, collaboration on assignments is encouraged, but you as an individual are responsible for understanding all the material in the assignment and doing your own work. Always strive to do your best, give generous credit to others, start early, and seek help early from both your professors and classmates.

The following rules are intended to help you get the most out of your education and to clarify the line between honest and dishonest work.

- Start by trying to solve homework, lab and project assignments yourself. You will get out of this course what you put into it.

- Please acknowledge any assistance you get from classmates, TAs or instructors.

- Please cite or acknowledge any online resources you use. This includes any help from online discussion fora or from AI tools.

- We reserve the right to ask you to verbally explain the reasoning behind any answer or code that you turn in and to modify your project grade based on your answers.

It is vitally important that you turn in work that is your own. Reports of academic dishonesty are handled by an academic review board and a finding of academic dishonesty may result in significant sanctions. For more details on Colby's Academic Integrity policies and procedures, see colby.edu/academicintegrity. (https://www.colby.edu/academicintegrity/)

- If you have had a substantive discussion of any homework or programming solution with a classmate, then be sure to cite them in your write-up. If you are unsure of what constitutes "substantive", then ask us or err on the side of caution. As one rule of thumb, you may discuss your approach to solving a problem, but you must not share or look at another classmate's code or written answers to project questions.

- **You must not copy answers or code from another student either by hand or electronically**. Another way to think about it is that you should communicate with one another in natural human sentences, not in lines of code from a programming language.

The Colby Affirmation	Colby College is a community dedicated to learning and committed to the growth and well-being of all its members.

As a community devoted to intellectual growth, we value academic integrity. We agree to take ownership of our academic work, to submit only work that is our own, to fully acknowledge the research and ideas of others in our work, and to abide by the instructions and regulations governing academic work established by the faculty.

As a community built on respect for ourselves, each other, and our physical environment, we recognize the diversity of people who have gathered here and that genuine inclusivity requires active, honest, and compassionate engagement with one another. We agree to respect each other, to honor community expectations, and to comply with College policies.

As a member of this community, I pledge to hold myself and others accountable to these values. More ... (https://www.colby.edu/catalogue/front-of-catalogue/colby-affirmation/)

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Academic Accommodations	We are available to discuss academic accommodations that any student with a documented disability may require. Please note that you'll need to provide a letter from the Dean of Studies Office documenting your approved accommodations. *Please meet with your instructor to make a request for accommodations at the beginning of the semester*--and at a minimum two weeks before any key due dates--so that we can work together with the College to make the appropriate arrangements for you. For more information about the Dean of Students Office: https://www.colby.edu/studentadvising/student-access-and-disability-services/ (https://www.colby.edu/studentadvising/student-access-and-disability-services/).

Mental and Emotional Wellbeing	We are invested in the mental and emotional health of our students. Even as we establish and maintain the academic standards of our course, we value each of you as individuals with complex lives, identities, and challenges.

Throughout the semester, the responsibilities of your Colby education may interact with situational as well as ongoing mental and emotional challenges in foreseeable and unforeseeable ways. If you are in need of reasonable flexibility due to an emotional situation or an ongoing mental health issue, please communicate as openly as possible with your Class Dean, and/or members of the office of Access and Disability Services, preferably in advance of the need, so that we can discuss how your circumstances interface with course requirements. Together, we will consider what is needed and what is possible. If we can discuss the situation, we can manage the situation together.

Please do not allow academic responsibilities to prevent you from getting help you need. Our Colby Counseling Services staff (207-859-4490) and the staff in the Dean of Studies office (207-859-4560) are available to connect with you. The safety of our students and every member of this community is paramount. If you or someone you know is struggling with thoughts of suicide or may be a danger to themselves or others, please call the on-call counselor immediately (207-859-4490, press '0')."

Respect for Diversity	It is our intent that students from diverse backgrounds and perspectives be well-served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. We expect you to feel challenged and sometimes outside of your comfort zone in this course, but it is our intent to present materials and activities that are inclusive and respectful of all persons, no matter their gender, sexual orientation, disability, age, socioeconomic status, ethnicity, race, culture, perspective, and other background characteristics.

Class rosters are provided to each instructor with the student's legal name. We will gladly honor your request to address you by an alternate name and/or gender pronoun. Please advise your instructor of this early in the semester so that we may make appropriate changes to our records. |
| **Athletic Participation** | While Colby College is supportive of athletic participation by its students, academics take priority over athletics. Both NCAA and Colby rules prohibit missing class for practices. In the case of overlapping commitments between class and athletic competitions, the student must meet with the instructor as soon as possible to discuss these overlaps. The student may request permission to miss class and make up the missed work; the instructor has final authority either to grant or to withhold permission. |
| **Religious Holidays** | If we have inadvertently scheduled an exam or major deadline that creates a conflict with your religious observances, please let us know within two weeks of the start of classes so that we can make other arrangements. Colby College is supportive of the religious practices of its students, faculty, and staff. The College is committed to ensuring that all students are able to observe their religious beliefs without academic penalty. |
| **Title IX Statement** | Colby College prohibits and will not tolerate sexual misconduct or gender-based discrimination of any kind. Colby is legally obligated to investigate sexual misconduct (including, but not limited to, sexual assault and sexual harassment) and other specific forms of behavior that violate federal and state laws (Title IX and Title VII, and the Maine Human Rights Act). Such behavior also requires the College to fulfill certain obligations under two other federal laws, the Violence Against Women Act (VAWA) and the Jeanne Clery Disclosure of Campus Security Policy and Campus Statistics Act (Clery Act). To learn more about what constitutes sexual misconduct or to report an incident, see: https://www.colby.edu/studentlife/handbook-section/f-sexualmisconduct/ (https://www.colby.edu/studentlife/handbook-section/f-sexualmisconduct/).

We are committed to all Colby students feeling safe, accepted, and included in all aspects of their college experiences, including this course. Colby prohibits and will not tolerate sexual misconduct or gender based discrimination of any kind and is obligated, by federal and state laws, to respond to reports and provide resources to students. Your instructors are considered "responsible employees"; we are required to report any incidence of sexual assault, sexual harassment, dating violence, or stalking to the Title IX Coordinator.

If you wish to access confidential support services, you may contact:

- The Counseling Center: 207-859-4490
- The Title IX Confidential Advocate, Emily Schusterbauer: 207-859-4093
- The Office of Religious and Spiritual Life: 207-859-4272
- Maines's 24/7 Sexual Assault Helpline: 1-800-871-7741 |