SYLLABUS Fall 2025

CS/STAT 3870 A: Data Science 1 Pinnacle, 3.00 CFU

Time: TTh 4:25pm-5:40pm

Class room: INNOVATION E430

28 Aug 2024 - 08 Dec 2024

Instructor: Dr. Alice Patania (she/her)

Office: Innovation E412

Drop-in hours: TTh 5:40pm - 6:30pm

e-mail: apatania@uvm.edu

Required Textbook: None (see additional resources below)

Prerequisites Required: CS 020 or CS 021 (Intro Programming) STAT 141 or STAT 143 or STAT 211 (Basic Statistical Methods). Recommended: CS 110 (Intermediate Programming) MATH 122 or MATH 124 (Linear Algebra) General Education Requirements Fulfilled by CS/STAT 287: Quantitative Reasoning

Technical support for students

Students, please read this technology check list to make sure you are ready for classes. https://www.uvm.edu/it/kb/student-technology-resources/ Students should contact the Helpline (802-656-2604) for support with technical issues.

Course Description

The goal of this course is to bridge the gap between model development and real-world deployment of a data analysis project. It was designed to ensure a comprehensive understanding of current Data Science tools and to teach how to keep up with the fast paced gen AI world.
Project work will be carried throughout the whole semester within the following units:

1. Experimental design and problem generation
2. Ethics of Data Science
3. Web Scraping and APIs
4. Casual Inference

Course Learning Objectives/Outcomes

As we journey through these topics, you will gain a holistic perspective, bridging the gap between model development and real-world deployment. With a blend of theory and practical exercises, this course entails that by the end, you're not just familiar with these concepts, but proficient in applying them.

Semester at a Glance

Aug	25	26	27	28	29	**1**	A little about me	P1
Sep	1	2	3	4	5	**2**	Team Formation	T1
	8	9	10	11	12	**3**	Problem Definition	P2
	15	16	17	18	19	**4**	Initial Data Acquisition	T2
	22	23	24	25	26	**5**	Comprehensive Data Acquisition	P3
Oct	29	30	1	2	3	**6**	Data understanding - Initial Cleaning	T3
	6	7	8	9	10	**7**	Data processing	P4
	13	14	15	16	17	**8**	Univariate, Bivariate Analysis	T4
	20	21	22	23	24	**9**	Hypothesis Generation	P5
	27	28	29	30	31	**10**	Model Selection	T5
Nov	3	4	5	6	7	**11**	Baseline Development	P6
	10	11	12	13	14	**12**	Feature Engineering	T6
	17	18	19	20	21	**13**	Model Validation	P7
Dec	1	2	3	4	5	**14**	Result Analysis	T7
	8	9	10	**11**	12	**F**	Presentation @ 4:15 pm in E430	

Required Course Materials

There is no required textbook for this course. We will be relying on a wealth of excellent open-source resources around Data Science Education. Links to readings, tutorials, and articles will be posted in each week's course materials.

Required platforms and software

Our course will rely on Brightspace as your home base for receiving instruction and materials, and for submitting assignments. It is recommended that you check Brightspace regularly. This is a programming-intensive course taught using Python, and homework and projects will use Python (version 3). If you don't have Python, and/or you are not familiar with it, you should download and install the latest (Python 3.8) version of Anaconda. I assume you have a personal computer to work from. If this is not the case, please see me so we can make accommodations.

While you are expected to have prior programming experience (e.g. UVM's CS 021), experience with Python is not strictly necessary. But please keep in mind that this may take significantly more time and effort.

For Brightspace information, students can access the following UVM Knowledge Base article:

https://www.uvm.edu/it/kb/article/brightspace-for-students/

Attendance Policy and Classroom Environment Expectations:

Regular attendance and active participation are essential for success in this course. Students are expected to:

Attend all scheduled class sessions.
Arrive on time and stay for the full duration.
Engage in discussions, group work, and other in-class activities.
Complete assigned readings and homework before class, as outlined in the course schedule.

Students should notify the instructor as soon as possible if they must miss class due to illness or emergency. In alignment with UVM policy:

- No doctor's note is required for short-term illnesses such as the flu or stomach bugs. Students are encouraged to rest and avoid contact with others until symptoms are manageable.
- If a student misses an exam or major assignment due to illness, they must contact the instructor within 48 hours to arrange a make-up or extension.
- For extended absences or chronic conditions, students should coordinate with \
- Student Accessibility Services and provide appropriate documentation.

Excused absences include documented illness, family emergencies, religious observances, and university-sponsored activities. Students are responsible for catching up on missed work and coordinating with peers or the instructor for notes and materials.

In this class, we will work together to develop a learning community that is inclusive and respectful. As a learning community we will seek to encourage and appreciate expressions of different ideas, opinions, and beliefs in the spirit of Our Common Ground. Meaningful and constructive dialogue is encouraged in this class. This requires mutual respect, willingness to listen, and open-mindedness to opposing points of view. Respect for individual differences and alternative viewpoints will be maintained at all times in this class. Conduct that substantially or repeatedly disrupts the ability of faculty and instructors to teach and the ability of students to engage may result in my asking a student to temporarily leave the classroom. See Undergraduate Catalogue - Classroom Code of Conduct.

Grading Criteria/Policies

Your final grade will be calculated based on the following components:

Participation and Attendance: 10%
Homework Assignments (Personal): 25%
Homework Assignments (Team): 25%
Final Report: 25%
Final Presentation: 15%

Late Policy
Assignments submitted up to 48 hours late will incur a 10% penalty.

Assign\ments submitted more than 48 hours late will receive a maximum of 50% credit, unless prior arrangements are made.
Extensions may be granted for documented emergencies or university-approved reasons. Requests must be made before the due date whenever possible.

Academic Integrity and AI:

The Academic Integrity policy addresses plagiarism, fabrication, collusion, and cheating. For this course we treat AI-based assistance, such as ChatGPT and Github Copilot, the same way we treat collaboration with other people: you are welcome to talk about your ideas and work with other people, both inside and outside the class, as well as with AI-based assistants. However, all work you submit must be your own. **You should never include in your assignment anything that was not written directly by you *without proper citation*** (including quotation marks and in-line citation for direct quotes). Including anything you did not write in your assignment without proper citation will be treated as an academic misconduct case.

If you are unsure where the line is between collaborating with AI and copying from AI, we recommend the following heuristics:

- Never hit “Copy” within your conversation with an AI assistant. You can copy your own work into your conversation, but do not copy anything from the conversation back into your assignment. Instead, use your interaction with the AI assistant as a learning experience, then let your assignment reflect your improved understanding.
- Do not have your assignment and the AI agent itself open on your device at the same time. Similar to above, use your conversation with the AI as a learning experience, then close the interaction down, open your assignment, and let your assignment reflect your revised knowledge.

This heuristic includes avoiding using AI assistants that are directly integrated into your composition environment: just as you should not let a classmate write content or code directly into your submission, so also you should avoid using tools that directly add content to your submission. Deviating from these heuristics does not automatically qualify as academic misconduct; however, following these heuristics essentially guarantees your collaboration will not cross the line into misconduct.
While experimenting freely, keep these points in mind:

- AI can demonstrate biases and inaccuracies at times. Always validate the content before accepting it.
- Be cautious with data privacy. Don't input anything too personal or private. You can't control where it ends up. If you wouldn’t post it on the internet, don’t give it to an AI.
- Recognize the limitations. AI doesn't truly comprehend facts or meaning yet. It makes guesses, which means it can confidently provide false information. AI content may initially seem impressive, but usually is not as good as you think it is. I call these AI goggles. Take care whenever using AI-generated text.

Also keep in mind that my AI-forward policy only applies to this class. Other professors likely have different rules. Using AI without permission could violate academic integrity policies. So always check the specific guidelines for each class first!

Assessments (Graded Work)

Students are expected to complete all graded work independently unless group collaboration is explicitly permitted. All submissions must reflect academic integrity and adhere to UVM's Code of Conduct.

Additional Policies

The following information and policies are helpful but not necessary for class.

Course Evaluation

All students are expected to complete two anonymous and confidential evaluations of the course:

A **Mid-Semester** Evaluation, typically launched in Week 6 and open for one week. Ideal to give anonymous feedback about what is not working for you in the way this course is being taught

A **Final Course** Evaluation, available during the last two weeks of classes, before finals week.

These evaluations are an important opportunity for you to share feedback about the course structure, content, instruction, and your learning experience. Constructive criticism and thoughtful suggestions are especially valued and will be used to improve the course for future semesters.

Lived Name and Pronoun Information

The UVM Directory includes fields for indicating your lived name and your pronouns. Lived names (preferred names, names in use) are names that an individual wants to be known by in the University community. Entering your pronouns is strongly encouraged to help create a more inclusive and respectful campus community. To update your information, login to the UVM Directory. A preview box will allow you to see how this information will appear in other systems used on campus such as Microsoft Teams and Blackboard.
More information about how to make changes to your lived name and pronouns is available in the Knowledge Base. To read more about official UVM policies, events, and other initiatives from the Division of Intercultural Excellence: https://www.uvm.edu/ie

Research and Citation Help

For help selecting research topics, finding information, citing sources, and more, ask a librarian. The UVM Libraries are eager to help. You may ask questions by phone, e-mail, chat, or text, or make an appointment for an individual consultation with a librarian.
Howe Library: https://library.uvm.edu/askhowe
Dana Medical Library: https://dana.uvm.edu/help/ask
Silver Special Collections Library: https://specialcollections.uvm.edu/help/ask

General statement regarding potential changes during the semester:

http://catalogue.uvm.edu/
The University of Vermont reserves the right to make changes in the course offerings, mode of delivery, degree requirements, charges, regulations, and procedures contained herein as educational, financial, and health, safety, and welfare considerations require, or as necessary to be compliant with governmental, accreditation, or public health directives.

Intellectual Property Statement/Prohibition on Sharing Academic Materials:

Students are prohibited from publicly sharing or selling academic materials that they did not author (for example: class syllabus, outlines or class presentations authored by the professor, practice questions, text from the textbook or other copyrighted class materials, etc.); and students are prohibited from sharing assessments (for example homework or a take-home examination). Violations will be handled under UVM's Intellectual Property policy and Code of Academic Integrity.

Tips for Success:

Success in this course requires consistent engagement with both theoretical concepts and hands-on coding practice. Below are strategies to help you stay on track and deepen your understanding:

- Complete all assigned readings before class to understand foundational concepts. Review lecture slides and notes regularly.
- Practice Coding Frequently. Set aside time each week to write and debug code outside of assignments.
- Focus on understanding algorithms, data structures, and model behavior rather than memorizing syntax. Try explaining concepts (e.g., gradient descent, overfitting) in your own words or to a peer.
- Tools like ChatGPT or Copilot can help with debugging or brainstorming, but always follow course policies. Document any use of AI tools in your assignments.
- Form study groups to discuss concepts and review code, but ensure all submitted work is your own.
- Build a Personal Code Repository. Use GitHub to track your progress and organize your code.

Here are a few resources for students on remote/online learning:

- Checklist for success in https://learn.uvm.edu/about/support-for-students/checklist-online-credit-courses/
- Academic support for online courses: https://www.uvm.edu/academicsuccess/online-learning-student-resources-remote-instruction

Helpful resources other than the professor (e.g., Undergraduate/Graduate Writing Center, Supplemental Instruction, Learning Co-op tutors, supplemental course materials)

Student Learning Accommodations:

In keeping with University policy, any student with a documented disability interested in utilizing ADA accommodations should contact Student Accessibility Services (SAS), the office of Disability Services on campus for students. SAS works with students and faculty in an interactive process to explore reasonable and appropriate accommodations, which are communicated to faculty in an accommodation letter. All students are strongly recommended to discuss with their faculty the accommodations they plan to use in each course. Faculty who receive Letters of Accommodation with Disability Related Flexible accommodations that go beyond the default accommodations will need to fill out the Disability Related Flexibility Agreement. Any questions from faculty or students on the agreement should be directed to the SAS specialist who is indicated on the letter.

Contact SAS:
A170 Living/Learning Center;
802-656-7753
access@uvm.edu
www.uvm.edu/access

Important UVM Policies

Academic Integrity:
The Academic Integrity policy addresses plagiarism, fabrication, collusion, and cheating.

Code of Student Conduct:

UVM's Code of Student Conduct outlines conduct expectations as well as students' rights and responsibilities.

FERPA Rights Disclosure:

The purpose of UVM's FERPA Rights Disclosure is to communicate the rights of students regarding access to, and privacy of their student educational records as provided for in the Family Educational Rights and Privacy Act (FERPA) of 1974.

Final Exam Policy:

The University final exam policy outlines expectations during final exams and explains timing and process of examination period.

Grade Appeals:

If you would like to contest a grade, please follow the procedures outlined in this policy.

Grading:

This link offers information on grading and GPA calculation.

Religious Holidays:

Religions may be practiced in many different ways, and can impact participation in classes variably. Students have the right to practice the religion of their choice. Each semester students should submit in writing to their instructors as early as possible and at least one week prior to their documented religious holiday the date(s) of the conflict or absence. Faculty must permit students who miss work or exams for the purpose of religious observance to make up this work. The complete policy is here.

Promoting Health & Safety:

The University of Vermont's number one priority is to support a healthy and safe community: Center for Health and Wellbeing offers a variety of resources, including resources to support physical and mental health and food security, including Counseling and Psychiatry Services (CAPS). The CAPS direct phone line is (802) 656-3340.
C.A.R.E. If you are concerned about a UVM community member or are concerned about a specific event, we encourage you to contact the Dean of Students Office (802-656-3380). If you would like to remain anonymous, you can report your concerns online by visiting the C.A.R.E. Team website.