



Course Information

Course Title: The Fault in Our Data: What Counts and Who's Counting

Course Number: ENES197

Term: Summer, 2026

Credits: 3

Course Dates: Mon. July 13 to Fri. July 31

Course Times: 1 pm – 4 pm

Professor: Dr. Kevin "Nicholas" Chiu (he/him)

Teaching Assistant: Michael Ladyzhensky (he/him)

Emails: knchiu@umd.edu, mlady@terpmail.umd.edu

Office Hours: 4-4:30 pm or by appointment

Classroom: Online, link TBA

Course Description

Quantitative data and analysis are key to understanding the shape of the world. In this course, we will use the tools of computational analysis to load, interrogate, visualize, and model datasets from dozens of data points to *hundreds of thousands*. We'll look at how computational methods can tell us when a movie is sexist, how wealth inequality can form, and how rumors spread like diseases. Then, you will find datasets of interest, write code to make sense of them, and share your findings with the world. **No prior programming experience is required.**

Course Tools

We will use the [Python](#) programming language and industry-standard software such as [numpy](#), [pandas](#), and [matplotlib](#). Much of the actual programming you do will be in electronic [Google Colab](#) notebooks.

Learning Outcomes

After successfully completing this course you will be able to:

Scholarship in Practice

1. *Select and critically evaluate* areas of scholarship relevant to the practice of data science
2. *Apply* data science methods and frameworks to the planning, modeling, and preparing necessary to produce a data science project
3. *Critique, revise, and refine* a project according to the authentic manner of data science
4. Effectively *communicate* the application of scholarship through written, oral, and visual material
5. *Collaborate* in order to bring about a successful outcome

Big Questions

1. *Identify* the major questions and issues in quantitative and computational data analysis.
2. *Describe* the sources experts in data science and computational modeling would use to explore these questions.

3. *Demonstrate* an understanding of basic terms, concepts, and approaches that experts employ in dealing with data.
4. *Demonstrate* an understanding of the political, social, economic, and ethical dimensions involved in data gathering and analysis
5. *Communicate* major ideas and issues raised by the course through effective written and oral presentations
6. *Articulate* how this course has invited you to think in new ways about your life, your place in the University and other communities, and issues central to your major discipline or other fields of interest.

Required Resources

- Course Website: elms.umd.edu
- A computer with access to a modern web browser, microphone, and webcam
- A valid Google (@terpmail.umd.edu) account
- A reliable, video-capable internet connection

Course Structure

This course will meet every weekday for about 180 minutes each meeting. Time spent in class will be a balance of in-class activities, group work, and discussion.

UMD Policies and Resources for Undergraduate Courses

It is our shared responsibility to know and abide by the University of Maryland's policies that relate to all courses, which include topics like:

- Academic integrity
- Student and instructor conduct
- Accessibility and accommodations
- Attendance and excused absences
- Grades and appeals
- Copyright and intellectual property

Please visit www.ugst.umd.edu/courserelatedpolicies.html for the Office of Undergraduate Studies' full list of campus-wide policies and follow up with me if you have questions.

Because this course is online, we will likely continue to meet in the event of inclement weather and the university closes. However, we understand that internet and computational resources may be limited during these times, so please let us know if you have difficulties accessing the full resources you need in this course. Please refer to the [university weather website](#) or call the weather emergency phone line (301-405-7669) for questions regarding campus closures.

Course Guidelines

Names/Pronouns and Self-Identifications

The University of Maryland recognizes the importance of a diverse student body, and we are committed to fostering inclusive and equitable classroom environments. To help us pronounce your name correctly, please complete the assignment on ELMS to tell us how you want to be referred to both in terms of your name and your pronouns

(he/him, she/her, they/them, etc.). The pronouns someone indicates are not necessarily indicative of their gender identity. Visit trans.umd.edu to learn more.

Additionally, how you identify in terms of your gender, race, class, sexuality, religion, and dis/ability, among all aspects of your identity, is your choice whether to disclose (e.g., should it come up in classroom conversation about our experiences and perspectives) and should be self-identified, not presumed or imposed. I will do my best to address and refer to all students accordingly, and I ask you to do the same for all of your fellow classmates.

Communication with Instructor

Email: If you need to reach out and communicate with me, please email me at knchiu@umd.edu. Please DO NOT email me with questions that are easily found in the syllabus or on ELMS (i.e. When is this assignment due? How much is it worth? etc.) but please DO reach out about personal, academic, and intellectual concerns/questions. While I will do my best to respond to emails within 24 hours, it may take me a bit longer.

ELMS: I will make IMPORTANT announcements on our course homepage. You must make sure that your email & announcement notifications (including changes in assignments and/or due dates) are enabled in ELMS so you do not miss any messages. You are responsible for checking your email and Canvas/ELMS inbox with regular frequency.

Communication with Peers

With a diversity of perspectives and experience, we may find ourselves in disagreement and/or debate with one another. As such, it is important that we agree to conduct ourselves in a professional manner and that we work together to foster and preserve a virtual classroom environment in which we can respectfully discuss and deliberate controversial questions.

I encourage you to confidently exercise your right to free speech—bearing in mind, of course, that you will be expected to craft and defend arguments that support your position. Keep in mind: free speech has its limit and this course is NOT the space for hate speech, harassment, and derogatory language. I will make every reasonable attempt to create an atmosphere in which each student feels comfortable voicing their argument without fear of being personally attacked, mocked, demeaned, or devalued.

Any behavior (including harassment, sexual harassment, and racially and/or culturally derogatory language) that threatens this atmosphere will not be tolerated. Please alert me immediately if you feel threatened, dismissed, or silenced at any point during our term together and/or if your engagement in discussion has been in some way hindered by the learning environment. At any point during this class, if the conversation is getting too heated, you or the instructors may ask for a one-minute silent reflection time to give people a minute to calm tempers, reflect, and articulate arguments. You may do so verbally if you feel comfortable doing so, or else you may privately message me or the TA to call for the minute anonymously.

Major Assignments

Engagement

- Active class participation (led both by the instructor and by students) is critical to the success of this course. As such, you are expected to attend class every day, make sure your computer is ready for the entire class period (powered up, charged/plugged in, software updated) and to participate actively in the in-class discussion. You are also expected to work equitably with your classmates during in-class group activities.

Homework Assignments

- You will have assignments that will provide an in-depth exploration of the materials covered in class. These will be pursued individually and will be turned in by the given deadline via the class' ELMS page.

Term Project

- This class will have an individual or small group project that will involve synthesizing the computational modeling, data analysis, and data visualization techniques that you learned over the course of the term and presenting it in writing and in an oral presentation. Project presentations will take place in class toward the end of the term. More details on these projects will be available near the second week of the term.

Grading Structure

Assignment	Percentage %
Engagement (e.g., attendance, participation in class discussions, in-class activities)	25%
Homework Assignments	25%
Term Project Write-Ups & Deliverables	25%
Term Project (Presentation)	25%
Total	100%

Academic Integrity

The University's [Code of Academic Integrity](#) is designed to ensure that the principles of academic honesty and integrity are upheld. In accordance with this code, the Clark School does not tolerate academic dishonesty. Please ensure that you fully understand this code and its implications because all acts of academic dishonesty will be dealt with in accordance with the provisions of this code. All students are expected to adhere to this Code. It is your responsibility to read it and know what it says, so you can start your professional life on the right path. **As future professionals, your commitment to high ethical standards and honesty begins with your time at UMD.**

It is important to note that course assistance websites, such as CourseHero, are not permitted sources. Material taken or copied from these sites can be deemed unauthorized material and a violation of academic integrity. These sites offer information that might not be accurate and that shortcut the learning process, particularly the critical thinking steps necessary for college-level assignments.







Additionally, it is understandable that students may use a variety of online or virtual forums for course-wide discussion (e.g., GroupMe, WhatsApp, or WeChat). Collaboration in this way regarding concepts discussed in this

course is permissible. However, collaboration on graded assignments is strictly prohibited unless otherwise stated. Examples of prohibited collaboration include: asking classmates for answers on quizzes or exams, asking for access codes to clicker polls, etc.

As of 2024, Generative AI tools ("GenAI") like ChatGPT are still a new technology that academia is learning to integrate. This course hopes, tangentially, to give you some understanding of what GenAI can and cannot do. We understand that GenAI can provide large productivity boosts and make tasks like programming much more accessible; as such, we allow a strict subset of tasks to be performed with GenAI. Specifically, we allow code to be written using the GenAI of your choice with an **explicit declaration** that GenAI was used to generate the code for in-class activities, homework, or the project. You may also choose not to use GenAI at all, in which case no declaration is needed. However, you may NOT use GenAI on any critical analysis, discussion, explanation, reflection, or other non-coding material, even for brainstorming. This is not a coding class, though code is used to perform tasks in this course. You are responsible for checking that any GenAI-produced code is correct.

Please visit the [Office of Undergraduate Studies' full list of policies](#) and follow up with me if you have questions.

To help you avoid unintentional violations, the following table lists levels of collaboration that are acceptable for each type of assignment. If you ever feel pressured to comply with someone else's academic integrity violation, please reach out to me straight away. **If you are ever unclear** about acceptable levels of collaboration, **please ask!**

	 OPEN NOTES	 SEARCH ONLINE	 ASK FRIENDS	 WORK IN GROUPS	 CITE SOURCES	 GATHER CONTENT With AI
In-class Activities	✓	✓	✓	✓	✓	With declaration, only for coding
Homework	✓	✓	✓	–	✓	With declaration, only for coding
Term Project	✓	✓	✓	✓	✓	With declaration, only for coding

Grades

All assessment scores will be posted on the course ELMS page. If you would like to review any of your grades, or have questions about how something was scored, please email me to schedule a time for us to meet and discuss.

Individual late work before the last (full or partial) week of classes will be accepted up to 24 hours late with a -10% penalty. **Group work and work due in the last (full or partial) week of class will not be accepted** for course credit, so please plan to have it submitted before the scheduled deadline. I am happy to discuss any of your grades with you, and if I have made a mistake I will immediately correct it. **Any formal grade disputes must be submitted in writing and within one week of receiving the grade.**

Final letter grades are assigned based on the percentage of total assessment points earned. To be fair to everyone I have to establish clear standards and apply them consistently, so please understand that being close to a cutoff is not the same as making the cut (89.99 \neq 90.00). It would be unethical to make exceptions for some and not others. These cutoffs may be shifted lower at the instructors' discretion, but not higher.

Final Grade Cutoffs									
+	97.00%	+	87.00%	+	77.00%	+	67.00%	F	<60.00%
A	93.00%	B	83.00%	C	73.00%	D	63.00%		
-	90.00%	-	80.00%	-	70.00%	-	60.00%		

Course Outline

Day	Topic	Core Disciplinary Questions
1	Introduction to Programming	<p>What is programming?</p> <p>What is data?</p> <p>How do we get data into a computable form?</p>
2	Programming Tools for Data Science	<p>What are the limitations of data?</p> <p>How can we describe the variation in our data?</p> <p>How can we describe the uncertainty in our data?</p> <p>What is ethical research?</p>
3	Problem Formation	<p>Which questions can data answer well, and which can it not?</p> <p>How do we turn a real-world issue into an analyzable question?</p> <p>What assumptions are we making before we start?</p>
4	Data Manipulation	<p>What are the basic/elemental operations we perform on data?</p> <p>How can we express chains of such computations?</p>
5	Data Collection	<p>What sources do data come from?</p> <p>Why should we care about data quality?</p> <p>Why do we standardize data representations?</p>
6	Visualization Part 1	<p>How can we explore data and communicate key findings visually?</p> <p>How can we examine the variation in our data?</p>
7	Visualization Part 2	<p>How can we "raise the voice" of our visualizations?</p> <p>How can we plot multiple dimensions of data at once?</p> <p>How should we deal with higher-dimensional data?</p>
8	Statistics and Debugging	<p>How can we use visualizations to debug our models?</p> <p>Why do we use summary statistics, and when shouldn't we?</p> <p>How do we find useful features of our data?</p>
9	Building Linear Models	<p>How do we create models that learn from our data?</p> <p>How can we conduct a full analysis of a dataset?</p> <p>How can we communicate methods and findings?</p>
10	Machine Learning: Supervised Learning	<p>How does ML relate to data science?</p> <p>How can we use ML in our analyses?</p>
11	Machine Learning: Unsupervised Learning	<p>What different insights can ML produce?</p>
12	Big Data Considerations and Bias	<p>What considerations must we take to scale up our models?</p>
13	Problematic Visualizations	<p>How can visualizations be used to deceive?</p> <p>How can we consume media with an "eyes open" mindset?</p> <p>How do we present data to different audiences?</p>
14	Ethics in AI Debate	<p>How do we discuss controversy in AI productively?</p>
15	Presentations	

Note: This is a tentative schedule, and subject to change as necessary – monitor the course ELMS page for current deadlines. In the unlikely event of a prolonged university closing, or an extended absence from the university, adjustments to the course schedule, deadlines, and assignments will be made based on the duration of the closing and the specific dates missed.

Resources & Accommodations

Accessibility and Disability Services

The University of Maryland is committed to creating and maintaining a welcoming and inclusive educational, working, and living environment for people of all abilities. The University of Maryland is also committed to the principle that no qualified individual with a disability shall, on the basis of disability, be excluded from participation in or be denied the benefits of the services, programs, or activities of the University, or be subjected to discrimination. The [Accessibility & Disability Service \(ADS\)](#) provides reasonable accommodations to qualified individuals to provide equal access to services, programs and activities. ADS cannot assist retroactively, so it is generally best to request accommodations several weeks before the term begins or as soon as a disability becomes known. Any student who needs accommodations should contact me as soon as possible so that I have sufficient time to make arrangements.

For assistance in obtaining an accommodation, contact Accessibility and Disability Service at 301-314-7682, or email them at adsfrontdesk@umd.edu. Information about [sharing your accommodations with instructors](#), [note taking assistance](#) and more is available from the **Counseling Center**.

Student Resources and Services

Taking personal responsibility for your own learning means acknowledging when your performance does not match your goals and doing something about it. I hope you will come talk to me so that I can help you find the right approach to success in this course, and I encourage you to visit [UMD's Student Academic Support Services website](#) to learn more about the wide range of campus resources available to you.

In particular, everyone can use some help sharpening their communication skills (and improving their grade) by visiting [UMD's Writing Center](#) and schedule an appointment with the campus Writing Center.

You should also know there are a wide range of resources to support you with whatever you might need ([UMD's Student Resources and Services website](#) may help). If you feel it would be helpful to have someone to talk to, visit [UMD's Counseling Center](#) or [one of the many other mental health resources on campus](#).

Basic Needs Security

If you have difficulty affording groceries or accessing sufficient food to eat every day, or lack a safe and stable place to live, please visit [UMD's Division of Student Affairs website](#) for information about resources the campus offers you and let me know if I can help in any way.

Technology Policy

Please refrain from using cellphones, laptops, and other electronic devices during class sessions unless we have designated such use as part of a class exercise.

Netiquette Policy

Netiquette is the social code of online classes. Students share a responsibility for the course's learning environment. Creating a cohesive online learning community requires learners to support and assist each other. To craft an open and interactive online learning environment, communication has to be conducted in a professional and courteous manner at all times, guided by common sense, collegiality and basic rules of etiquette.

Participation

- Given the interactive style of this class, attendance will be crucial to note-taking and thus your performance in this class. Attendance is particularly important also because class discussion will be a critical component for your learning.
- Each student is expected to make substantive contributions to the learning experience, and attendance is expected for every session.
- Students with a legitimate reason to miss a live session should communicate in advance with the instructor, except in the case of an emergency.
- Students who miss a live session are responsible for learning what they miss from that session.
- For a homework bonus point, please send the TA a picture and a fun fact about your favorite animal by the start of the second day of class.
- Additionally, students must complete all assignments in a timely manner in order to fully participate in class.

Course Evaluation

Please submit a course evaluation through CourseEvalUM in order to help faculty and administrators improve teaching and learning at Maryland. All information submitted to CourseEvalUM is confidential. Campus will notify you when CourseEvalUM is open for you to complete your evaluations for fall term courses. Please go directly to the [Course Eval UM website](#) to complete your evaluations. By completing all of your evaluations each term, you will have the privilege of accessing through Testudo, the evaluation reports for the thousands of courses for which 70% or more students submitted their evaluations.

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