

DATA 100

Math for Data Science

Professor:

Dr. Joanna Bieri
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Class:

Spring 2025
M,W,F - 1:15-2:30

Office Hours:

Posted on the class website

Welcome to Math for Data Science

The goal of this course is to learn the basics of the mathematics that we use to do data science. Classes, lectures, and group interactions should be a safe learning space where each member of the community feels valued, listened to, and respected. It is the responsibility of each of us to ensure that we are lifting up our peers, breaking free from old biases, reaching across cultural or socioeconomic boundaries, and supporting each other. If at any time in the class you feel that there is something that could be done to improve your learning or your experience please let me know. I am here to lift you up and help you learn!

In this class we will learn some of the most important ideas from math that are used in data science. Some of the topics might be a review for you and some of the topics might be totally new to you, everyone has a different math background but we are all here to be supported in our success! This class will encourage you to check your work and do calculations using Python (or SageMath). This will allow us to focus on the big mathematical ideas and less on the specific calculations. This class is not a replacement for Calculus, Linear Algebra, or Probability - all fabulous classes that go into much more depth.

Course Learning Objectives

By the end of the semester your work must reflect your ability to

1. Use functions and variables to interact with data.

2. Understand and use exponents, logarithms, and algebraic equations.
3. Develop and solve systems of equations.
4. Explain what a derivative is and what the result of a derivative means.
5. Use derivatives to optimize.
6. Use basic ideas from probability to interpret and represent data.
7. Set up matrix equations and solve linear systems in Python.

What are your goals for the class?

Technology

You absolutely need access to a computer. We will use Jupyter-Lab or Cocalc to do mathematical calculations in Python. Homework and announcements will be posted on the class website. Homework will be submitted on Canvas.

Textbooks

- Essential Math for Data Science, Thomas Nield (978-1098102937) - Cost: \$43
- No bullshit guide to math and physics 5 edition, Ivan Savov (978-0992001001) - Cost: \$31

Classwork

Consistent participation and engagement are crucial to your success in the class. Please read the following carefully:

- i. **Pre-Class Preparation:** You should come to class prepared to learn. This includes completing the homework assignments and reading from the previous class, taking the pre-class quiz, and watching any pre-class lectures available on the course website.
- ii **In-Class Participation:** In class you should be actively working on and discussing math. Bring your computer and try out all the things we are learning about! We will talk about more advanced ideas in class. Missing more than 2 days of class (unexcused) will result in a 50% reduction in your In-Class Participation grade and each additional missed class will decrease your grade further
- iii **Weekly Homework:** Homework will be assigned during the week and due each week on Friday evening. Homework is graded as pass-fail. If you fail you can resubmit the assignment once.
- iv **Exams:** There will be four midterm exams - think of these more as mini-exams or quizzes. My goal is to keep them short and give lots of time for checking answers. You will be allowed access to the text book and a computer.
- v **Final Exam:** Cumulative final exam. (Optional for students who have successfully participated in every element of the course and are happy with their grade)

Evaluation Procedures

There are five elements of the course which contribute to your overall grade, as follows:

Pre-Class Preparation	10%
In-Class Participation	20%
Homework	30%
Midterm Exams	20%
Final Exam	20%

How to Succeed in this Class

All work for the course will be graded according following criteria.

- Students can demonstrate pre-class preparation by coming to class prepared. This means completing all required reading, starting on the assignments or worksheets, and watching any provided videos. Additionally, daily quizzes will demonstrate your preparation for class.
- Students can demonstrate in-class participation by attending every class. In addition, students should be actively involved in the discussion during class time. For some this will be active speaking, for others it will be taking notes and posting them for the class, for others it will be talking in small groups or helping with collaboration. There are lots of ways to participate, let me know how you best like to contribute!
- Each weekly homework will be submitted on Canvas and graded for 10 points. See the homework prompts on the class website for specific details on each assignment. You will submit your own individual homework, but working in groups is encouraged.
- Exams will be in class, but you will have access to your notes, the text book, and a computer running Python.

Grading Scales:

4.0	95-100%
3.7	90-94%
3.3	87-89%
3.0	83-86%
2.7	80-82%
2.3	77-79%
2.0	73-76%
1.7	70-72%
1.3	67-69%
1.0	63-66%
0.7	60-62%

Please note: According to the University Course Catalog (p. 13) 3.7 and 4.0 are reserved for “outstanding” work; 3.3 and 3.0 are both defined as “excellent,” not mediocre.

Communication

- The most reliable way to reach me is by email. Please note that my normal working hours are 9 a.m. to 5 p.m., Monday to Friday. I do not respond to emails after 5 p.m. or on weekends, except in an emergency.
- You can make appointments with me via email. Appointments can happen in Duke 209 or on Teams.
- It is important that you communicate throughout the semester. Let me know if there are ways I can improve your learning in the class. If you are going to miss class or need an extension on the homework, the earlier you tell me the better!

Health Protocols

- In an effort to keep the classroom community safe and healthy, please follow the guidelines outlined here:
 - Wearing a mask is voluntary.
 - Do not come to class if you feel ill or have been exposed to someone who is ill.
- In any case of the above, e-mail me directly to reconcile any class work and/or attendance issues.

Please contact me if you have any concerns as to your health needs and goals for the semester.

Academic Honesty

The University of Redlands enforces strict standards as regards academic honesty, and students may be dismissed for breaches of these standards.

In light of this, please note that:

- intentional plagiarism—i.e. piecemeal or whole-sale appropriation of text from one or more printed or internet source—will result in a fail grade for the course.
- plagiarism by default—i.e. uncredited adoption of ideas from source texts due to carelessness in citation—will result in a fail grade for the project.

Artificial Intelligence: There is no tolerance for the use of generative artificial intelligence in place of individual work and thinking in this course. All work is to be considered a student's own. Any violation of that will result in a failing grade for the work.

If you are still in any doubt about what constitutes plagiarism, please ask me before you hand in your work!

Office of Equity and Title IX

In order to provide a safe and equitable learning environment for all students, faculty, and staff, discrimination, harassment, retaliation, sexual misconduct, and sexual harassment (including sexual assault, dating or domestic violence, and stalking) are not tolerated at the University of Redlands. The University prohibits unlawful discrimination or harassment (as defined in the Policy Prohibiting Discrimination, Harassment, Sexual Misconduct, and Retaliation) on the basis of age, color, race, ethnicity, national origin, ancestry, sex, marital status, pregnancy, status as a complaining party of domestic violence, sexual orientation, gender, gender identity or expression, physical or mental disability,

genetic information, religion/creed, citizenship status (except to comply with legal requirements for employment), military/veteran status, or any other characteristic protected by law. If you or someone you know has experienced or experiences any of these behaviors, know that you are not alone. You can contact the Office of Equity and Title IX for reporting options, supportive measures, and resources to support you.

Many faculty and staff at the University of Redlands are considered “Responsible Employees,” which means that if you tell me about a situation involving any of the above, I must report the matter to the Office of Equity and Title IX. Although I make that report, you are in control of how you would like to proceed, including whether or not you wish to pursue a formal complaint. Our goal is to make sure you are aware of the range of reporting options available to you and have access to the support and resources you need.

To report an incident directly, you can:

- Contact the Interim Director of Equity & Title IX, Christopher Jones, at 909-748-8289 or titleix@redlands.edu
- Report online at:
www.redlands.edu/titleixandequity

You can also report to local law enforcement at 909-798-7681, ext. 1. If you are ever in immediate danger, please call 911 or email/text 911@redlandspolice.org if you cannot call. To reach Public Safety on campus, call 909-748-8888 or use the Rave Gaudian App

If you wish to speak to someone confidentially (meaning not connecting with the Office of Equity and Title IX Office), you can contact the following resources:

- Campus:

- Counseling Center: 909-748-8108 or 24-Hour Crisis Line: 909-748-8960
- TimelyCare, 24/7 emotional support; 12 free telehealth counseling sessions

- Community:

- Partners Against Violence, 24-hour sexual assault crisis line: 909-885-8884
- Option House, 24-hour dating/domestic violence crisis line: 909-381-3471 Online: <https://www.rainn.org/> (sexual assault); <https://www.loveisrespect.org/>

You can also report to local law enforcement at (909) 798-7681, ext. 1. If you are ever in immediate danger, please call 911 or email/text 911@redlandspolice.org if you cannot call.

If you wish to speak to someone confidentially (meaning not connecting with the Office of Equity and Title IX Office), you can contact the following resources:

- Campus: Counseling Service: 909-748-8108 or 24-Hour Crisis Line: 909-748-8960 or Chaplain’s Office: 909-748-8368
- Community: Partners Against Violence, 24-hour sexual assault crisis line: 909-885-8884
- Option House. 24-hour dating/domestic violence crisis line: 909-381-3471
- Online chat: <https://www.loveisrespect.org/>

For more information, visit www.redlands.edu/titleixandequity

Accommodations

If you are a student with a disability requesting reasonable academic accommodations in this course, please contact Academic Support and Accessibility (ASA). ASA is located in the Student Success Center on the ground floor of the Armacost Library. You can reach the office at 909-748-8069

or asa@redlands.edu. All requests for reasonable accommodations require registration with ASA in advance of need. Faculty, students, and ASA will work together regarding classroom accommodations. You are encouraged to discuss approved accommodations with your faculty. More information is available on the ASA webpage.

If there are ways that simple changes to the class could improve your learning please feel free to reach out to me directly.

Counseling Center

The Counseling Center provides free and confidential mental health services, including short-term individual therapy, group therapy, single-session therapy, consultations, and urgent appointments to all students with in-person or virtual options. Our Counseling Center is committed to inclusivity and to providing a supportive space for everyone. Please call 909-748-8108 to schedule an appointment or email counseling_center@redlands.edu. If a student is in crisis, please call 909-748-8960 for the 24/7 mental health crisis line. For more information on our resources, go here. Another option for individual therapy for all students is TimelyCare, which provides virtual therapy immediately (Talk Now) or up to 12 scheduled virtual therapy sessions per year. Students can choose their therapist from a list of providers for the scheduled therapy option.

Conflict Resolution Center

Experiencing a conflict? Whether it’s with a friend, roommate, another member of a student organization, or faculty or staff member, conflicts happen. Learning to navigate conflicts is important to success in virtually any field, and a vital step in being a part of a community and having healthy, meaningful relationships with others. See <https://sites.redlands.edu/conflict-resolution-center/student-resources/> for more information.

The Care Team

The University CARE Team exists to help provide support and resources to students that are overwhelmed, experiencing significant distress, or possibly present some risk to themselves or others. As a faculty member, I may reach out to students about whom I am concerned to talk individually, and/or refer them to the CARE Team. If you have concerns about a fellow student, consider sharing your concern with the CARE Team via their online form. This is part of who we are as a caring, proactive community where we all look out for one another. Additionally, if you feel that you or someone else needs immediate mental health support, the University has a 24/7 mental health crisis line at 909-748-8960, and the Timely Care app, which offers on-demand emotional care. Both services connect to a live, licensed counselor.

Additional Resources

If you are in need of additional resources, please refer to the available programs below.

Book Lending Program

The Book Lending Program is an initiative to ensure the academic success of First-Generation students (students who are the first to go to college in their families who meet a particular estimated family contribution [EFC] level). Funded through

alumni donations, this program provides books and other classroom materials, when needed, for First-Generation students who could not otherwise afford to purchase them. Books are returned at the end of the course, to be used by other First-Generation students the next semester. The program works alongside the Library and faculty members to ensure the availability of books and classroom materials. For more information, click the link above or contact blp@redlands.edu.

Emergency Student Loans

Student Financial Services (SFS) administers a short-term, no-interest loan fund to assist students experiencing an emergency or cash-flow problem. Except in unusual circumstances, these loans do not exceed \$200 and are billed to the student's account. Evidence of repayment ability is a prerequisite for all short-term loans made to students. Students are not eligible for more than one emergency student loan per term. Contact: SFS@redlands.edu or x8047

Student Lounges

Lounges for all students to sit, work, and eat can be found here on the University website.

Student Affairs Discretionary Fund

These endowed funds in Student Affairs can be used to support student success and remove im-

pediments that otherwise may cause the student to stop or leave school. To utilize this fund, divisional leadership should be made aware of the student in dire need of financial support. This support can be anything from personal expenses, such as utility bills, gas money, emergency trips home due to family tragedy, off-campus counseling, and other medical costs, and occasionally mental health assessment expenses. Students receive grants based on their financial need. Contact: student_affairs@redlands.edu.

Student Food Support Pantry

The Student Food Support Pantry is a resource available to all established full and part-time University of Redlands students facing food insecurities. The Pantry is located on the north side of North Hall. This space is an open, no-questions-asked space with dried and canned goods, and non-perishable items, as well as seasonal fresh produce from our sustainable farm and limited refrigerated goods. Food for this distribution is provided in partnership with Feeding America Riverside and San Bernardino. It is also funded through private donations, ASUR, and the Office of Community Service Learning. For more information, please contact SURF@redlands.edu.

Course Schedule

Schedule is subject to change as we progress through the semester. You will be notified of any changes in class.

Math for Data Science – Spring 2025

DATE	WEEK	DAY	Lecture Topic	Assignments, Prep, and Exams	Other Notes
01/08/25	1	Wednesday	Welcome to Math for Data Science + Self Assessment		Don't forget to prepare for next class!
01/10/25	1	Friday	Math Fundamentals	Class Prep Day 2	I am here to help! It is 100% okay if you don't remember or never learned these topics!
01/13/25	2	Monday	Math Fundamentals	Class Prep Day 3	
01/15/25	2	Wednesday	Number Theory – Order of Operations	Class Prep Day 4	
01/17/25	2	Friday	Variables Functions	Class Prep Day 5 – Homework 1	
01/20/25	3	Monday	Basic Functions	Class Prep Day 6	
01/22/25	3	Wednesday	Summations	Class Prep Day 7	Come get help if you need it! Math is challenging, but your brain can do it!
01/24/25	3	Friday	Pause for Understanding	Class Prep Day 8 – Homework 2	
01/27/25	4	Monday	Exponents and Logarithms	Class Prep Day 9	
01/29/25	4	Wednesday	More Functions	Class Prep Day 10	
01/31/25	4	Friday	Pause for Understanding	Class Prep Day 11 – Homework 3	
02/03/25	5	Monday	Solving Linear Systems	Class Prep Day 12	
02/05/25	5	Wednesday	Lab	Class Prep Day 13	Exam1 in class Friday
02/07/25	5	Friday	Exam 1	Exam 1	
02/10/25	6	Monday	Limits	Class Prep Day 15	Now we are getting a little more abstract, try to really imagine what is going on.
02/12/25	6	Wednesday	Derivatives	Class Prep Day 16	
02/14/25	6	Friday	Pause for Understanding	Class Prep Day 17 – Homework 4	
02/17/25	7	Monday	Derivatives	Class Prep Day 18	
02/19/25	7	Wednesday	Derivatives	Class Prep Day 19	
02/21/25	7	Friday	Partial Derivatives	Class Prep Day 20 – Homework 5	
02/24/25	8	Monday	What is an integral	Class Prep Day 21	
02/26/25	8	Wednesday	Lab	Class Prep Day 22	Exam 2 in class Friday
02/28/25	8	Friday	Exam 2	Exam 2	
03/03/25	Spring Break				
03/05/25	Spring Break				
03/07/25	Spring Break				
03/10/25	9	Monday	Understanding Probability	Class Prep Day 24	Switching gears to Probability – but please don't forget all the calculus we just learned.
03/12/25	9	Wednesday	Joint Probabilities	Class Prep Day 25	
03/14/25	9	Friday	Pause for Understanding	Class Prep Day 26 – Homework 6	
03/17/25	10	Monday	Union Probabilities	Class Prep Day 27	

03/19/25	10	Wednesday	Conditional Probability	Class Prep Day 28	
03/21/25	10	Friday	Pause for Understanding	Class Prep Day 29 – Homework 7	
03/24/25	11	Monday	Probability Distributions	Class Prep Day 30	
03/26/25	11	Wednesday	Probability Distributions	Class Prep Day 31	Exam 3 in class Friday
03/28/25	11	Friday	Exam 3	Exam 3	
03/31/25	12	Monday	Matrices and Vectors	Class Prep Day 33	Linear algebra is one of the most used mathematical ideas!
04/02/25	12	Wednesday	Matrix multiplication	Class Prep Day 34	
04/04/25	12	Friday	Pause for Understanding	Class Prep Day 35 – Homework 8	
04/07/25	13	Monday	Determinants	Class Prep Day 36	
04/09/25	13	Wednesday	Solving Linear Systems	Class Prep Day 37	
04/11/25	13	Friday	Lab	Class Prep Day 38 – Homework 9	
04/14/25	14	Monday	Review		Exam 4 in class Wednesday
04/16/25	14	Wednesday	Exam 4	Exam 4	