DATA 201
Intermediate Data Science

Professor:	Class:	Office Hours:
Dr. Joanna Bieri	Fall 2025	
joanna_bieri@redlands.edu	M,W,F: 1:15-2:30	Posted on the class website

Welcome to Data Science

The goal of this course is to expand upon your experience in DATA101 to explore more advanced processes and best practices of 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!

This course expands upon the introductory course with a continued focus on the full data life cycle reproducible results and being a good data custodian. Intermediate topics include data management, collaboration, machine learning, prediction techniques, and data privacy and ethics. Attendance is expected at all class meetings unless you have notified me ahead of time.

Course Learning Objectives

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

1. Use computers to implement advanced data analysis techniques.
2. Write code to do data science.
3. Obtain, wrangle, clean, and do an exploratory analysis on data.
4. Present professionally formatted reproducible results of a data science project in written, oral, and graphical form.
5. Expand your understanding of moral issues surrounding collection of data and use of algorithms.
6. Apply machine learning techniques to data.
7. Learn about how to build a data science carreer.
8. Work in a team using good communication, version control, and code sharing techniques.
9. Have some fun exploring the data!

What are your goals for the class?

Technology

You absolutely need access to a computer that can run Anaconda Python and JupyterLab. We will install all the packages you need on the first day of class. We will use JupyterLab to do our data science programming and GitLab for version control.
Homework and announcements will be posted on the class website. Homework will be submitted on Canvas.

Textbooks

- Python for Data Analysis by Wes McKinney - (9781098103989) - Cost: $45
- Build a Career in Data Science by Emily Robinson and Jacqueline Nolis (978-1617296246) - Cost: $35
- Introduction to Machine Learning in Python by Andreas M uller and Sarah Guido (978-1449369415) - Cost: $55

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 Data Science. 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 daily and due each week on Friday evening. Each assignment should include both working Python code where appropriate for the assignment along with a written discussions of the data and reflection of your progress. Homework is graded as pass-fail. If you fail you can resubmit the assignment once.

iv **Exams**: There will be two midterm exams where your goal is to show your mastery of the data science topics. Exam 1 will cover advanced Python

for Data Analysis and Exam 2 will cover Modeling and Machine Learning.

v **Final Project**: Working in teams of 2-4 students you will complete a final data science project inspired by an area of interest to the group.

Evaluation Procedures

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

Pre-Class Preparation	10%
In-Class Participation	10%
Homework	30%
Midterm Exams	30%
Final Project	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 watching all the videos, completing all required reading, and starting on the assignments or worksheets. 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.

- The final project is your chance to show mastery of the concepts for the class. You will propose your final project during the semester and work with your peers and professor to clearly define your goals.

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 wholesale 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!

Equity and Title IX

The University of Redlands is committed to creating a safe, inclusive, and equitable learning environment. Discrimination, harassment, retaliation, and

sexual misconduct, including sexual assault, dating or domestic violence, and stalking, are not tolerated. If you or someone you know experiences these behaviors, support and reporting options are available.

Faculty are considered Responsible Employees and are required to report any disclosures of such conduct to the Office of Equity and Title IX. Reporting does not require you to file a formal complaint, but ensures you are informed of your rights and resources.

For more information, support, or to file a report, visit www.redlands.edu/titleixandequity or email the Title IX Coordinator at **titleix@redlands.edu**.

Confidential support is available through the Counseling Center (909-748-8108) or TimelyCare. Additional Resources can be found 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

Accommodations

The University of Redlands is committed to providing equal access to its programs and courses in accordance with the ADA and Section 504 of the Rehabilitation Act. If you have a disability and need reasonable accommodations in this class, please contact Academic Support and Accessibility (ASA) as early as possible to begin the registration process. ASA (located on the ground floor of the Armacost Library) can be reached at 909-748-8069 or **asa@redlands.edu**. All accommodations must be approved through ASA before they can be implemented, and accommodations cannot be applied retroactively. Once your eligibility is verified, ASA will provide you with an accommodation letter for your instructors. Faculty, students, and ASA will then work together to arrange appropriate accommodations that support your learning needs without fundamentally altering essential course requirements. You are strongly encouraged to discuss your approved accommodations with your instructors early in the term. For more information, please visit the ASA webpage (https://www.redlands.edu/student-life/student-resources/accessibility).
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.

Aditional 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 impediments 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.

Intermediate Data Science – Fall 2025				
DATE	**WEEK**	**DAY**	**Lecture Topic**	**Book Chapters**
09/03/25	1	Wednesday	Install computer packages - GIT - Python - Review Python Programming	Python for Data Analysis – chapter 2.3 and chapter 3
09/05/25	*1*	*Friday*	*Review of DATA 101* *Make sure your computer is working!*	
09/08/25	2	Monday	Start – Advanced Data Analysis in Python Advanced topics in pandas: descriptive statistics and essential functions.	Python for Data Analysis – chapter 5
09/10/25	2	Wednesday	Data Loading and Storage: JSON data, Piecewise text files, and other delimited formats Being a responsible data steward.	Python for Data Analysis – chapter 6
09/12/25	2	Friday		
09/15/25	3	Monday	Data Cleaning and Preparation: missing data, transformations, string manipulation, categorical data.	Python for Data Analysis – chapter 7
09/17/25	3	Wednesday	Data Wrangling: Join, Combine and Reshape	Python for Data Analysis – chapter 8
09/19/25	3	Friday		

09/22/25	4	Monday	Data Visualizations: Plotly, Matplotlib, Pandas, and Seaborn Avoiding misrepresentation	Python for Data Analysis – chapter 9
09/24/25	4	Wednesday	Data Aggregation and Group Operations.	Python for Data Analysis – chapter 10
09/26/25	4	Friday		
09/29/25	5	Monday	Time Series Data: Timestamps, periods, resampling and frequency conversion.	Python for Data Analysis – chapter 11
10/01/25	5	Wednesday	Advanced Web Scraping Techniques The ethical scraper	Reading assigned on Canvas
10/03/25	*5*	*Friday*	*Advanced Web Scraping Techniques*	
10/06/25	6	Monday	Putting it all together: Data Science/Analysis Project	Focus on writing and presentation
10/08/25	6	Wednesday	Ethics in Data Acquisition Analysis	Reading assigned on Canvas
10/10/25	*6*	*Friday*	*Exam 1 – Data Analysis in Python*	*Exam 1*
10/13/25	7	Monday		STUDY DAY
10/15/25	7	Wednesday	Start – Modeling and Machine Learning Classifying Iris Species – your first model	Introduction to Machine Learning with Python – chapter 1.7
10/17/25	7	Friday		

10/20/25	8	Monday	Review of Linear and Logistic Regression Generalizations, Overfitting, and Underfitting	Introduction to Machine Learning with Python – Chapter 2.1 – 2.2
10/22/25	8	Wednesday	Supervised Learning – kNearest Neighbors and Linear Models	Introduction to Machine Learning with Python – Chapter 2.3.1 – 2.3.3
10/24/25	8	Friday		
10/27/25	9	Monday	Supervised Learning – Naive Bayes Classifiers	Introduction to Machine Learning with Python – chapter 2.3.4
10/29/25	9	Wednesday	Supervised Learning – Decision Trees	Introduction to Machine Learning with Python – chapter 2.3.5
10/31/25	9	Friday		
11/03/25	10	Monday	Supervised Learning – Support Vector Machines and Linear Discriminant Analysis	Introduction to Machine Learning with Python – chapter 2.3.7
11/05/25	10	Wednesday	Unsupervised Learning – Preprocessing and Scaling	Introduction to Machine Learning with Python – chapter 3.1 – 3.3
11/07/25	10	Friday		

11/10/25	11	Monday	Unsupervised Learning – PCA Which features (variables) matter?	Introduction to Machine Learning with Python – chapter 3.4.1
11/12/25	11	Wednesday	Unsupervised Learning – kMeans Clustering	Introduction to Machine Learning with Python – chapter 3.5.1
11/14/25	*11*	*Friday*	*Exam 2 – Modeling and Machine Learning*	*Exam 2*
11/17/25	12	Monday	Start – Model Evaluation and Advanced Methods Cross-Validation	Introduction to Machine Learning with Python – chapter 5.1
11/19/25	12	Wednesday	Grid Search and Overfitting	Introduction to Machine Learning with Python – chapter 5.2
11/21/25	12	Friday		
11/24/25	13	Monday	Evaluation Metrics	Introduction to Machine Learning with Python – chapter 5.2
11/26/25	13	Wednesday	THANKSGIVING	
11/28/25	13	Friday		
12/01/25	14	Monday	Putting it all together: The Data Science Lifecycle – Data Gathering – Analysis – Modeling – Evaluation – Presentation	Reading assigned on Canvas
12/03/25	14	Wednesday	Final Project Working Day	Focus on analysis and code
12/05/25	14	Friday		
12/08/25	15	Monday	Final Project Working Day	Focus on writing and presentation
Final Exam Week	15	12/12/2025 Noon	During our final exam period each group will present their results.	

Final Project Info – Career Building – Other Announcements
Weekly Career Building – Read Build a Career in Data Science 1.1 What is Data Science
Weekly Career Building – Read Build a Career in Data Science 1.2 Different Types of Data Science Jobs
Weekly Career Building – Read Build a Career in Data Science 1.3 Choosing your Path

Weekly Career Building – Read Build a Career in Data Science 2.1 Data Science Companies – Massive Tech
Weekly Career Building – Read Build a Career in Data Science 2.2 Data Science Companies – Established Retailers
Get some initial data for your final project. Start the data preparation process.
Weekly Career Building – Read Build a Career in Data Science 2.3 and 2.4 Data Science Companies - Startups
Weekly Career Building – Read Build a Career in Data Science 2.5 Data Science Companies – Giant Government Contractors

Weekly Career Building – Do a job search. What kind of data jobs are there in your area of interest?
Final project proposals due
Weekly Career Building – Read Build a Career in Data Science 4.1 and 4.3 Building a portfolio – Create a project and Working on example projects
Weekly Career Building – Read Build a Career in Data Science 5.1 and 5.2 Identifying the right job for you. Don't forget to sign up for Spring Classes: DATA 211 – Introduction to Databases and Data Management

Weekly Career Building – Read Build a Career in Data Science 6.1 and 6.2 The application – Resume and Cover Letter basics
Final Project EDA and Modeling Proposals due
Weekly Career Building – Write a draft of your Resume and a cover letter for an example job.
Weekly Career Building – Read Build a Career in Data Science 6.3 The application – Tailoring your application
Weekly Career Building – Read Build a Career in Data Science 7+ The interview – what to expect and how to handle it.
Final projects are due 12/14/24 11:59pm