

INFO-2301: Quantitative Reasoning for Information Science

Dr. David Burlinson

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Office Hours: M 12-1:00pm, F 10-10:55am
Office: TLC 219

Class Hours: MWF 11-11:50am
Class Room: Education Bldg 155

Course Description

Introduces methods for quantifying and analyzing different types of data, covering foundational concepts in discrete mathematics, probability, and predictive modeling, along with complementary computational skills to apply these concepts to real problems. Covers counting and combinatorics, logic, set theory, introductory probability, common probability distributions, regression, and model validation. Requires demonstrated proficiency with introductory computer programming.

Topics

The following topics will be covered:

- Data types and corresponding data structures in Python
- Operations on data structures (sets and vectors)
- Counting and combinatorics (combinations and permutations)
- Probability concepts (independence, marginalization, expected value)
- Probability distributions (discrete and continuous)
- Conditional probability (language modeling and music generation as applications)
- Probability in Python (distributions, pseudorandom sampling)

Learning Goals

By the end of this semester you will be able to:

- Understand the different types of data and discrete structures
- Understand the concepts of uncertainty in data
- Solve problems involving probabilistic data, knowing which concepts and distributions apply to a problem
- Randomly generate data and run simulations in code

Required Materials

- We will use [OpenIntro Statistics](#)
- Assignments will use [Python 3](#) in [Jupyter notebooks](#)

Prerequisites/Corequisites

INFO 1201 or CSCI 1200 or CSCI 1300 or CSCI 1310

Grading Policy

Final grades are calculated according to the following distribution:

- 5% Attendance
- 10% Quizzes (in class and/or online)
- 40% Homework
- 20% Midterm Exam
- 25% Final Exam

Letter grades will follow a typical scoring distribution (A if $\geq 93\%$, A- if $\geq 90\%$, B+ if $\geq 87\%$, B if $\geq 83\%$, B- if $\geq 80\%$, C+ if $\geq 77\%$, and so on). Do not expect most grades to be curved, though exam grades may be curved if needed

Course Policies

Classroom Behavior

You are expected to bring a laptop to class unless otherwise stated. Notify the instructor if you need to borrow a laptop.

Students and faculty each have responsibility for maintaining an appropriate learning environment. Those who fail to adhere to such behavioral standards may be subject to discipline. Professional courtesy and sensitivity are especially important with respect to individuals and topics dealing with race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Class rosters are provided to the instructor with the student's legal name. I will gladly honor your request to address you by an alternate name or gender pronoun. Please advise me of this preference early in the semester so that I may make appropriate changes to my records. For more information, see the policies on [classroom behavior](#) and the [Student Code of Conduct](#).

Attendance Policy

Attendance will be checked on random days without notice. If you need to miss class for any reason, you will typically be excused as long as you notify the instructor before the class.

Late Work

Late assignments will receive 80% of credit up to one day late, and 50% of credit if more than two days late. Assignments will not be accepted after two days.

Collaboration

Except when specified otherwise, you may work in groups of up to three students on homework. Each student must turn in their own work, and you must list the names of all group members after your name.

Accommodations for Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. If you qualify for accommodations because of a disability, please submit your accommodation letter from Disability Services to your faculty member in a timely manner so that your needs can be addressed. Information on requesting accommodations is located on the [Disability Services](#) website. Contact Disability Services at 303-492-8671 or dsinfo@colorado.edu for further assistance. If you have a temporary medical condition or injury, see Temporary Medical Conditions under the Students tab on the Disability Services website and discuss your needs with your professor.

Religious Holidays

Campus policy regarding religious observances requires that faculty make every effort to deal reasonably and fairly with all students who, because of religious obligations, have conflicts with scheduled exams, assignments or required attendance. In this class, notify the instructor as soon as you are aware of the conflict, with a minimum notice of one week.

See the [campus policy regarding religious observances](#) for full details.

Sexual Misconduct, Discrimination, Harassment and/or Related Retaliation

The University of Colorado Boulder (CU Boulder) is committed to maintaining a positive learning, working, and living environment. CU Boulder will not tolerate acts of sexual misconduct, discrimination, harassment or related retaliation against or by any employee or student. CU's Sexual Misconduct Policy prohibits sexual assault, sexual exploitation, sexual harassment, intimate partner abuse (dating or domestic violence), stalking or related retaliation. CU Boulder's Discrimination and Harassment Policy prohibits discrimination, harassment or related retaliation based on race, color, national origin, sex, pregnancy, age, disability, creed, religion, sexual orientation, gender identity, gender expression, veteran status, political affiliation or political philosophy. Individuals who believe they have been

subject to misconduct under either policy should contact the Office of Institutional Equity and Compliance (OIEC) at 303-492-2127. Information about the OIEC, the above referenced policies, and the campus resources available to assist individuals regarding sexual misconduct, discrimination, harassment or related retaliation can be found at the OIEC website.

Honor Code

All students enrolled in a University of Colorado Boulder course are responsible for knowing and adhering to the academic integrity policy. Violations of the policy may include: plagiarism, cheating, fabrication, lying, bribery, threat, unauthorized access to academic materials, clicker fraud, resubmission, and aiding academic dishonesty. All incidents of academic misconduct will be reported to the Honor Code Council (honor@colorado.edu; 303-735-2273). Students who are found responsible for violating the academic integrity policy will be subject to nonacademic sanctions from the Honor Code Council as well as academic sanctions from the faculty member. Additional information regarding the academic integrity policy can be found at the Honor Code Office website.