Intro to Statistics and Data Science (STAT 202)

Fall 2023

Course Description

THIS COURSE INTRODUCES students to the discipline of statistics as a science of understanding and analyzing data. Students will learn the importance of data collection and sampling, methods to analyze data, and how to use data to make inferences and conclusions about real world phenomena. Students will be introduced to the free statistical programming software, Posit Cloud, to apply both descriptive and inferential statistics to real data sets.

When:
Sec20: Mon, Wed, Fri 9:00 - 9:50 am
Sec21: Mon, Wed, Fri 1:00 - 1:50 pm

Location: Harris Hall Rm 107

Prerequisite: High School Algebra

Instructional Team

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Office Hours - held virtually
📹 998 6392 3813

MAKE INDIVIDUAL APPOINTMENT/MEETING requests through Campuswire (discussed below) by selecting *Post to instructors and TAs*.

Course Goals

1. USE STATISTICAL SOFTWARE to manage and process data.
2. USE STATISTICAL SOFTWARE to perform exploratory data analyses. That is, explore data numerically and visually to gain understanding through data and generate hypotheses and inferences to later test.
3. RECOGNIZE THE IMPORTANCE of data collection, identify limitations in data collection methods, and determine how they affect the scope of inference.
4. BUILD A CONCEPTUAL UNDERSTANDING of the unified nature of statistical inference.
5. APPLY ESTIMATION AND TESTING METHODS to analyze single variables or the relationship between two variables in order to understand natural phenomena and make data-based decisions.
6. MODEL NUMERICAL RESPONSE VARIABLES using a single or multiple explanatory variables.
7. INTERPRET RESULTS in context without relying on statistical jargon.
8. CRITIQUE AND EVALUATE data-based claims and decisions.

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"Numbers don't lie. That's where we come in."

Course Structure

THE BULK OF THIS COURSE will follow a flipped design. Meaning the majority of class time will be dedicated to working on activities. A typical class will devote 10-15 minutes to discussion/lecture with the remainder of the class devoted to working on activities where students will either work by themselves or in groups. Throughout the class we will discuss and review the work on the activities. In many cases we may come together to work on parts of an activity as a class.

Students are expected to prepare for class time by working through the indicated learning material prior to each class meeting.

Textbook (Free Online)

WE WILL BE USING Introduction to Statistics and Data Science[1] which is a free online book that we have been developing for this course.

[1] https://nustat.github.io/intro-stat-data-sci/

Software

WE WILL BE USING/INTRODUCING the free statistical software Posit Cloud.

Posit Cloud (formerly called RStudio Cloud), https://posit.cloud/

Hardware

STUDENTS WILL NEED a laptop or Chromebook to be able to follow lectures and to work with Posit Cloud to complete activities. If access to a laptop is an issue, then please contact the course instructor and we will work to find an accommodation.[2]

[2] This requirement will not prevent students from taking this course.

Asking Questions & Course Communication

This term we will be using Campuswire as our preferred platform for questions about activities, reading checks, and general course questions. The system is highly catered to getting you help quickly and efficiently from classmates and the instructional team. Rather than emailing questions to the instructional team, you should post your questions on Campuswire.

The instructional team will check Campuswire periodically and answer questions[3], but we strongly encourage students to answer each other's questions. To this end, student will be able to earn bonus points — see Canvas for details.

Enrollment Code: 4301

Questions concerning individual grades or appointments should be addressed through email.

[3] Please do not expect answers during weekends and evenings.

Tips for Success

- DEDICATE YOURSELF to being an active and engaged learner.
- PREPARE FOR CLASS by *reading and working* through code *before* class.[4]
- WORK IN GROUPS to learn and complete activities[5].
- ASK QUESTIONS! Ask them during class, office hours, or on Campuswire[6].
- CONTRIBUTE TO a welcoming and inclusive learning environment.
- DON'T BE AFRAID to make mistakes, you learn from mistakes.

[4] Complete the reading checks!

[5] Don't just copy, help each other.

[6] Be active on Campuswire!
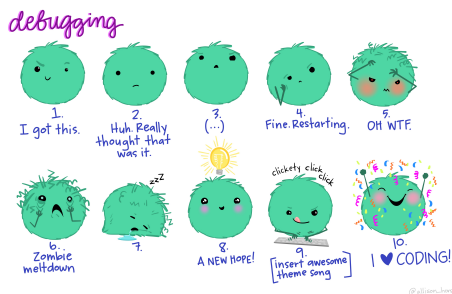
Debugging code is something we all struggle with and go through. It is a process and you will get better over time, but no matter your skill level there will always be struggles. Illistration by Allison Horst

Evaluation

STUDENTS WILL BE EVALUATED through (1) participation and small assignments; (2) reading checks; (3) activities; (4) 3 exams; and a (5) final project. Reading checks will be completed using "Tutorials" on Posit Cloud and uploaded to the course Canvas page. All daily activities will be graded for completion. This doesn't mean that your solutions are correct, so make sure that you check them against the solutions.

There will be 3 in-class exams; they will be structured very similarly to your reading checks. Students will be allowed one 8.5 x 11 inch cheat sheet (front & back) on each in-class exams. The exams are not cumulative.

There will be 1 final group project. You will pick your own group of 3-6 people. More information will be provided later in the quarter.

Each reading check will be scaled to be worth 10 points.

Exam Improvement Policy

WE HAVE WORKED TO DEVELOP a policy geared towards a growth mindset. That is, we want a policy where students clearly demonstrate that they have used the exam as a diagnostic tool to learn from and improve their understanding of statistics. There is NO final cumulative exam, instead you may choose to retake 1 exam during the designated final exam time. This exam will replace your old score — only in cases where it is an improvement.

Missed Exam Policy

There are no make-up exams. If you miss an exam due to illness, travel, etc., you will need to take the exam during the final exam period as your re-take exam.

Late Policy

ANY WORK SUBMITTED AFTER the due date will incur a 10% late penalty. Absolutely no assignments will be accepted more than three days after the due date without prior approval. To account for these strict due dates, we will drop your 3 lowest reading check scores **and** your 3 lowest activities.

Grading

GRADING SCALE	
93.0 - 100%	A
90.0 - 92.9%	A-
87.0 - 89.9%	B+
83.0 - 86.9%	B
80.0 - 82.9%	B-
77.0 - 79.9%	C+
73.0 - 76.9%	C
70.0 - 72.9%	C-
60.0 - 69.9%	D
Below 59.9%	F

CATEGORY	WEIGHT
Participation/Small Assignments	5%
Activities	10%
Reading Checks	15%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Final Project	10%

Final grades will be rounded to nearest tenth of a percent. There is NO curve to this course. Take advantage of the exam improvement policy and any extra credit opportunity.

Students opting to take this course Pass/No Pass must (1) take and pass the final exam with at least a D and (2) earn a course grade of at least a D.

Academic Resources

Quarter-Long Study Groups offers peer-led academic support in a small-group setting for students enrolled in this course. If you join the program, you will meet weekly with about 5 to 8 other students and a peer facilitator[7]. During

[7] A student who has already taken and done well in the course

sessions, students review concepts, work through practice problems, raise questions, and work together to develop answers. Students register for the full quarter on CAESAR and weekly attendance is expected. Study Groups sessions are listed below course lecture and discussion sections (e.g., STAT 202-SG Peer-Guided Study Group: Introduction to Statistics and Data Science).

Contact Borislava Miltcheva (`pgsg@northwestern.edu`) with any questions.

Drop-In Support (No Appointment Needed)

Drop-In Peer Tutoring is set up such that students can drop in to study alone or with others and ask questions of a peer leader who has done well in the class. Tutoring is provided for many of the introductory courses in Biology, Chemistry, Economics, Engineering, Mathematics, Physics, and **Statistics**. Check their website for a complete list of supported courses.

Contact Valerie Wolf (`valerie.wolf@northwestern.edu`) with any questions.

Attendance Expectation/Policy

WHILE WE DO NOT collect formal attendance we do record participation. Implicit in the course design it is expected that you attend class to benefit from working with others — either by helping others or by helping others learn.

Religious Observance

NORTHWESTERN IS COMMITTED to fostering an academic community respectful and welcoming of persons from all backgrounds. To that end, the policy on academic accommodations for religious holidays stipulates that students will not be penalized for class absences to observe religious holidays. If you will observe a religious holiday during a class meeting, scheduled exam, or assignment deadline, please let your instructor know as soon as possible, preferably within the first two week of class.

COVID-19 or Emergencies

COMMUNITY HEALTH REMAINS OUR PRIORITY. If you are experiencing symptoms of COVID-19, **do not attend class** and follow the steps outlined by the CDC for testing and isolation. Contact your instructor as soon as possible to make plans to complete your coursework.

Students who experience other personal emergencies should contact the instructor as soon as possible to arrange to complete coursework.

Should public health recommendations prevent in-person class from being held on a given day, the instructor or the university will notify students.

Use of Generative AI (for example ChatGPT)

IN THIS COURSE, GENERATIVE AI RESOURCES ARE encouraged to be used by students **with the purpose of supporting their learning**.[8] To ensure academic integrity, students must openly disclose any AI-generated material they utilize and provide proper attribution.This includes in-text/code citations, quotations, and references. **Instructions will clearly state when these tools are not to be used.**

When using these tools students will typically be asked to create personal accounts for artificial intelligence services and/or software. Students should familiarize themselves with the Terms of Use for these services as well as the expectations around data privacy and use.[9]

[8] Only turn to generative AI as a last resort/step. Never begin with it. Without developing a basic understanding first you won't be able determine the usefulness or correctness of its output.

[9] Students **should not share** private, or otherwise sensitive information or data, about themselves or others, with these tools, as there is often no guarantee of data privacy.

Accessibility & Accommodations

NORTHWESTERN UNIVERSITY IS COMMITTED to providing the most accessible learning environment as possible for students with disabilities. Should you anticipate or experience disability-related barriers in the academic setting, please contact AccessibleNU to move forward with the university's established accommodation process[10]. If you already have established accommodations with AccessibleNU, please let me know as soon as possible, preferably within the first two weeks of the term, so we can work together to implement your disability accommodations. Disability information, including academic accommodations, is confidential under the Family Educational Rights and Privacy Act.

[10] email: accessiblenu@northwestern.edu; phoone: 847-467-5530

Recording

THIS CLASS OR PORTIONS OF THIS CLASS might be recorded by the instructor for educational purposes. Your instructor will communicate how members of the class can access the recordings. Portions of the course that contain images, questions or commentary/discussion by students will be edited out of any recordings that are saved beyond the current term.

UNAUTHORIZED STUDENT RECORDING of classroom or other academic activities is prohibited.[11] Unauthorized recording is unethical and may also be a violation of University policy and state law.

[11] Includes advising sessions or office hours.

Students requesting the use of assistive technology as an accommodation should contact AccessibleNU. Unauthorized use of classroom recordings — including distributing or posting them — is also prohibited.

Under the University's Copyright Policy, faculty own the copyright to instructional materials — including those resources created specifically for the purposes of instruction, such as syllabi, lectures and lecture notes, and presentations. Students cannot copy, reproduce, display, or distribute these materials.

Students who engage in unauthorized recording, unauthorized use of a recording, or unauthorized distribution of instructional materials will be referred to the appropriate University office for follow-up.

Academic Integrity

STUDENTS IN THIS COURSE ARE REQUIRED to comply with the policies found in the booklet, "Academic Integrity at Northwestern University: A Basic Guide". All papers submitted for credit in this course must be submitted electronically unless otherwise instructed by the professor. Your written work may be tested for plagiarized content. For details regarding academic integrity at Northwestern or to download the guide, visit: https://www.northwestern.edu/provost/policies-procedures/academic-integrity/index.html

Sexual Misconduct & Reporting

NORTHWESTERN UNIVERSITY IS COMMITTED to fostering an environment where students are safe and free from sexual misconduct. Confidential resources are available to those who have experienced sexual misconduct.[12]

Faculty, instructors, and TAs are **not** confidential resources and are required to report incidents of sexual misconduct, whether discussed in your assignments or in person, to the Title IX Coordinator, who can provide information about resources and options.

We encourage students who have experienced sexual misconduct to talk with someone to get support. For more information visit the Get Help[13].

Discrimination & Sexual Harassment

NORTHWESTERN UNIVERSITY'S policies on Discrimination, Harassment, and Sexual Harassment apply to all members of the University community, including students, staff, and faculty. Any student, staff, or faculty member who believes that they have been discriminated against or harassed on the basis of his or her race, color, religion, national origin, sex, sexual orientation, gender identity, gender expression, parental status, marital status, age, disability, citizenship, veteran status, genetic information or any other classification protected by law, should contact the Office of Equal Opportunity and Access[14] or the Sexual Harassment Prevention Office[15].

Additional information about the University's discrimination and harassment policies, including the campus resources available to assist individuals with discrimination or harassment concerns, is available online on the Human Resources Equal Opportunity and Access website[16].

[12] See http://www.northwestern.edu/sexual-misconduct/get-help/confidential-support.html for details.

[13] http://www.northwestern.edu/sexual-misconduct/get-help/index.html

NORTHWESTERN STRICTLY PROHIBITS retaliation against any member of its community for reporting or inquiring about wrongful or unlawful activity. For more details see https://policies.northwestern.edu/docs/non-retaliation-policy-FINAL.pdf.

[14] 847.491.7458

[15] 847.467.6571

[16] http://www.northwestern.edu/hr/equlopp-access/index.html

Wellness & Mental Health Resources

NORTHWESTERN UNIVERSITY IS COMMITTED TO supporting the wellness of our students. Student Affairs has multiple resources to support student wellness and mental health. If you are feeling distressed or overwhelmed, please reach out for help. Students can access confidential resources through the Counseling and Psychological Services (CAPS), Religious and Spiritual Life (RSL) and the Center for Awareness, Response and Education (CARE). Additional information on all of the resources mentioned above can be found here:

- https://www.northwestern.edu/counseling/
- https://www.northwestern.edu/religious-life/
- https://www.northwestern.edu/care/

Student Resources

STUDENT ENRICHMENT SERVICES (SES) PARTNERS with FGLI students – pronounced figly – who are first-generation, lower-income, and/or DACA/Undocumented. SES works with these students to foster identity development, navigate campus resources, and build community. Through campus-wide partnerships and advocacy, SES strives to build an inclusive Northwestern community that is welcoming, supportive, and accessible for all students. SES can connect you to a number of resources (emergency aid assistance, books, supplies, laptops, food accessibility and much more!) both within the SES office and across campus. For more information please visit https://www.northwestern.edu/enrichment.

Tentative Course Schedule

Posted on the Course Website!

THERE IS ALMOST ALWAYS something due on Tuesday, Thursday, and Sunday.