



Syllabus: STAT 3201

Introduction to Probability for Data Analytics

Autumn 2024

3 Credit Hours

Instructional staff

Instructor

Instructor: Steve MacEachern

Email: maceachern.1@osu.edu

Office Hours: Monday, 11:30 – 12:30; Friday, 10:30 – 11:30; Cockins Hall 440D

Grader

Grader: To be announced – keep an eye on the CARMEN site

Email: TBA

Email

The preferred method of contact is email. For course emails, the subject line should be STAT 3201. Use of this subject line will help me keep my email organized. In line with Ohio State policies on your privacy, your email should be sent from your official OSU “name.#” email address. Email from a non-OSU account will not be answered. I will try to reply to your email within two business days, but, with the amount of email I receive, I cannot guarantee a reply on this timeline.

Many questions – especially those about homework – are better answered in person. Feel free to stop by my office hour or to make use of the tutoring room in Pomerene Hall. For questions that come in via email, if the question is of general interest, I may post your question verbatim on Carmen, along with a response for all to see.

Course description

An introduction to probability and its role in statistical methods for data analytics. Equal emphasis is placed on analytical and simulation-based methods for quantifying



uncertainty. Approaches to assessing the accuracy of simulation methods are discussed. Applications of probability and sampling to big-data settings are discussed.

Prerequisites

Math 1152, 1161.xx, 1172, 1181 or equivalent, and CSE Placement Level A or equivalent; or permission of the instructor. Not open to students with credit for Stat 4201 or Math 4530.

Course website

Important announcements, course materials, homework assignments, information on computing, and other class information will be posted on Carmen (carmen.osu.edu).

Textbook

The required textbook for this course is

Mathematical Statistics with Applications (7th edition), by Wackerly, Mendenhall, and Sheaffer

The text will be supplemented with additional material. For computing with R, the following free resource will prove useful

Introduction to Probability and Statistics using R, by Kerns; available online at <https://cran.r-project.org/web/packages/IPSUR/vignettes/IPSUR.pdf>

Course expected learning outcomes

By the end of this course, students should successfully be able to:

1. Quantify uncertainty about events using mathematical descriptions of probability
2. Quantify uncertainty about events using simulation methods
3. Assess the quality and accuracy of simulation-based descriptions of uncertainty
4. Update a description of uncertainty based on new information
5. Identify appropriate probability models for experiments/data and summarize expected outcomes from such models
6. Use correlation and conditional expectation to describe the relationship between two variables
7. Quantify uncertainty about summary statistics for large data sets



Computing

The course will make use of the R computing environment. R is a statistical software package that is available for free download. I strongly encourage you to make use of RStudio, as this platform will be used heavily in future courses. This course will get you the tiniest start on R.

Grading

The final course grade will consist of

Homework: 15%

Exam 1: 25%

Exam 2: 25%

Final Exam: 35%

Your lowest homework score will be dropped before computing your grade.

Grading Scale

For the broad grade categories (A/B/C/D, without pluses or minuses), the grade cutoffs will not be higher than 90% for an A, 80% for a B, 70% for a C, and 60% for a D. I reserve the right to adjust these cutoffs if I deem it appropriate. The actual grades may be higher than these “standard cutoffs”. Grades for all students will be assigned in the same fashion.

Homework assignments

Homework assignments will be posted on Carmen. There will be approximately eight homework assignments during the term. Problems will be a mix of textbook-style problems, problems motivated by applications, and problems that require you to use R. Questions from the textbook are for the edition listed above.

You are encouraged to talk to other students in the course about the homework problems and to work on them together. However, each student must write up their own homework to turn in. Do not copy any part of another student’s homework. Use of homework solutions from previous offerings of the course or of solutions found online or elsewhere is not allowed. You are also not allowed to disseminate the homework



assignments or solutions to them. Nor are you allowed to knowingly facilitate others' doing so.

Your solutions to the homework assignment are to be uploaded to CARMEN as a pdf. Your solutions can be (neatly) handwritten, say on an ipad in Notability or a similar app, or typed before turning them into a pdf. Alternatively, a high quality picture may be turned into a pdf. R code and output should be in typewritten form. Clearly label the problems. This will help the grader immensely.

Late assignments

There will be a deduction of 10% for homework assignments that are one day late; 20% for assignments that are two days late. Assignments will not be accepted if more than two days late – the grade on such an assignment will be zero.

Exams

There will be three in-class exams. The exams will cover lecture material, assigned reading, and homework. Tentative dates will be available on the Carmen site. The dates for the two “midterm” exams are tentative and may be adjusted. The final exam will take place as scheduled.

For the exams, statistical tables will be provided (if needed). You may use a calculator, but no communication devices (e.g., phones) are allowed. For each exam, you may bring one 8.5” x 11” handwritten sheet of paper with notes and formulas. This is a standard size sheet of paper.

Make up exams require a valid excuse and official proof. If you are unable to take an exam, notify the instructor as soon as possible. A make up exam must be taken within one week of the missed exam. Exceptions to this policy are permitted only in extreme situations.

Grade disputes

If you wish to dispute a grade on homework or an exam, you must raise the issue, in writing, within one week of the homework or exam being returned to the class. Disputes that are raised later than that will not be considered for a regrade.

Special considerations

If a situation arises that you think may hinder your progress in this class, you are expected to notify me as soon as possible.



Course Schedule

Refer to the Carmen course page for a tentative course schedule and up-to-date assignments and due dates.

Attendance

Attendance is obligatory but not mandatory. But note that homework and exams may rely on material covered in class that is not in the textbook.

Academic policies

Academic integrity policy

See **Descriptions of major course assignments**, above, for my specific guidelines about collaboration and academic integrity in the context of this online class.

It is the responsibility of the Committee on Academic Misconduct to investigate or establish procedures for the investigation of all reported cases of student academic misconduct. The term “academic misconduct” includes all forms of student academic misconduct wherever committed; illustrated by, but not limited to, cases of plagiarism and dishonest practices in connection with examinations. Instructors shall report all instances of alleged academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct: <http://studentlife.osu.edu/csc/>.

If I suspect that a student has committed academic misconduct in this course, I am obligated by university rules to report my suspicions to the Committee on Academic Misconduct. If COAM determines that you have violated the university’s Code of Student Conduct (i.e., committed academic misconduct), the sanctions for the misconduct could include a failing grade in this course and suspension or dismissal from the university.

If you have any questions about the above policy or what constitutes academic misconduct in this course, please contact me.

Other sources of information on academic misconduct (integrity) to which you can refer include:

- Committee on Academic Misconduct web page (go.osu.edu/coam)
- Ten Suggestions for Preserving Academic Integrity (go.osu.edu/ten-suggestions)

Copyright for instructional materials



The materials used in connection with this course may be subject to copyright protection and are only for the use of students officially enrolled in the course for the educational purposes associated with the course. Copyright law must be considered before copying, retaining, or disseminating materials outside of the course.

Statement on title IX

Title IX makes it clear that violence and harassment based on sex and gender are Civil Rights offenses subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories (e.g., race). If you or someone you know has been sexually harassed or assaulted, you may find the appropriate resources at <http://titleix.osu.edu> or by contacting the Ohio State Title IX Coordinator at titleix@osu.edu

Commitment to a diverse and inclusive learning environment

The Ohio State University affirms the importance and value of diversity in the student body. Our programs and curricula reflect our multicultural society and global economy and seek to provide opportunities for students to learn more about persons who are different from them. We are committed to maintaining a community that recognizes and values the inherent worth and dignity of every person; fosters sensitivity, understanding, and mutual respect among each member of our community; and encourages each individual to strive to reach his or her own potential. Discrimination against any individual based upon protected status, which is defined as age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status, is prohibited.

Land acknowledgement

We would like to acknowledge the land that The Ohio State University occupies is the ancestral and contemporary territory of the Shawnee, Potawatomi, Delaware, Miami, Peoria, Seneca, Wyandotte, Ojibwe and Cherokee peoples. Specifically, the university resides on land ceded in the 1795 Treaty of Greenville and the forced removal of tribes through the Indian Removal Act of 1830. I/We want to honor the resiliency of these tribal nations and recognize the historical contexts that has and continues to affect the Indigenous peoples of this land.

More information on OSU's land acknowledgement can be found here:

<https://mcc.osu.edu/about-us/land-acknowledgement>

Your mental health

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down,



difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling 614-292-5766. CCS is located on the 4th Floor of the Younklin Success Center and 10th Floor of Lincoln Tower. You can reach an on-call counselor when CCS is closed at 614-292-5766 and 24 hour emergency help is also available 24/7 by dialing 988 to reach the Suicide and Crisis Lifeline.

Accessibility accommodations for students with disabilities

Requesting accommodations

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. If you anticipate or experience academic barriers based on your disability (including mental health, chronic, or temporary medical conditions), please let me know immediately so that we can privately discuss options. To establish reasonable accommodations, I may request that you register with Student Life Disability Services. After registration, make arrangements with me as soon as possible to discuss your accommodations so that they may be implemented in a timely fashion.

If you are isolating while waiting for a COVID-19 test result, please let me know immediately. Those testing positive for COVID-19 should refer to the [Safe and Healthy Buckeyes site](#) for resources. Beyond five days of the required COVID-19 isolation period, I may rely on Student Life Disability Services to establish further reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

Religious accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.



With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the [Office of Institutional Equity](#).

Policy: [Religious Holidays, Holy Days and Observances](#)