



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 6801 STATISTICAL THEORY I AUTUMN 2024

COURSE OVERVIEW

Instructor

Instructor: Steve MacEachern

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Office hours: Monday, 11:30 – 12:30; Friday 10:30 – 11:30; and by appointment

Office Location: 440D Cockins Hall

Grader or Teaching Assistant

Grader: Kiljae Lee

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Office hours: Wednesday, 10:20 – 11:20

Office location: 305E Cockins Hall or zoom at

<https://osu.zoom.us/j/98286825757?pwd=6CN9MSMOV3MVXwNyZGaopgVkb5xeEf.1>

Course description

This is the first course in a two-semester sequence on probability and theoretical statistics. The course is required for the MS and PhD in Statistics and for the PhD in Biostatistics. In it, we will cover the basics of probability, random variables, common distributions, distribution theory, concepts of convergence, and we will get a start on principles of inference.

Course materials

Required

Statistical Inference (2nd Edition), by George Casella and Roger Berger.

Additional sources

There are many good books on Statistical Theory. Casella and Berger takes a mathematical approach to the subject. Others are a bit softer mathematically but have a more lucid description of the central concepts. Two of my favorites along these lines are Statistical Theory by Bernie Lindgren (Third Edition) and Probability and Statistics by Morrie DeGroot (1st or 2nd edition, not revised version with Schervish). The old classic, Mathematical Methods of Statistics, by Harald Cramer, is dated but wonderful. It is sharp, correct, and at a high mathematical level.

These older books are widely available. You may find them in the library or at a bargain price on the internet.

Course delivery

This course is designed to be in person. In the event that circumstances force a change, we will adapt. Details of the adaptation will depend on the circumstances.

Grading

Grades

Your numerical grade for this course will be computed on the basis of:

Homework Assignments – 20%

Midterm Exams (two) – 50%

Final Exam – 30%

Your two homework scores will be dropped before computing your homework grade. If you miss a homework assignment, you will receive a zero for the assignment (likely one that you will drop).

Assignment information

The reading assignments will not be graded. But read the book. It's a good one.

You will have homework assignments at a pace of roughly one assignment per week. The baseline expectation is for you to spend two hours outside of class on this course for each nominal hour in class. Depending on your background and the pace at which you work, your actual time may be longer or shorter than this expectation.

Homework assignments will contain a mix of problems from the textbook and additional problems. The assignments will be available on Carmen. Solutions to the assignments will be posted after the assignments are due.

The midterm exams will be closed book, closed notes. Each exam will take one class period. Tentative dates for the exams are Monday, September 30 and Friday November 8. These dates are tentative. They may change, depending on the pace of lectures.

The final exam is closed book, closed notes. It will take place as scheduled by the university registrar. The date of the exam is Monday, December 9, from 10:00 AM to 11:45 AM. The exam will be held in the regular classroom.

Late assignments

Assignments will be due, in class, in hard-copy format. The choice of format is to make grading more efficient and to make it easier to provide you with feedback. For late assignments, one (business) day late is a deduction of 10%; two days late, of 20%; beyond two days late, the assignment will not be accepted.

Grading scale

Final grades will be assigned on the basis of performance in the course. The grades will not be lower than those in the “straight scale” of 90% for an A, 80% for a B, 70% for a C and so on. The exams will contain some difficult problems. I expect the cutoffs to be lower than those from the straight scale.

Simple numerical calculation will typically translate directly to your grade. In some circumstances, I may adjust grades upward.

Attendance

The class is designed around the lectures. Attendance is strongly encouraged as is class participation. If you have questions, ask in class or see me after class or during office hours.

If you are unable to attend due to COVID-19 or for other reasons, let me know. If you test positive for the virus or believe that you have symptoms, it is best that you take care of health concerns before worrying about this class. Let me know of the situation promptly and we will make special arrangements.

Other course policies

Potential disruptions to instruction

The planned instruction for this course may be disrupted for a number of reasons. Such disruptions may affect individual students for a brief period of time, the entire class, the instructor, or the entire university. If the class is disrupted, we will adjust as needed. The adjustments may include changes to course delivery, assignments, grading of assignments, and determination of final course grade.

Student support services

Information on student support services is available at <http://ssc.osu.edu>.

Academic integrity policy

The main purpose of this course is for you to learn the material and to increase your understanding of Statistics. For the homework assignments, you can talk with fellow students and you can work on the problems with them. Your write-up should be your own. For the exams, you are to work solely on your own. A calculator will be permitted but cell phones will not be permitted. Tables will be provided as needed.

Note that this policy of open discussion on the homework is specific to this course. Other instructors and other courses may well have a different policy. Make sure that you understand the policy for each course that you take.

Ohio State's academic integrity policy

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. I will report serious academic misconduct to the committee (Faculty Rule 3335-5-487). For additional information, see the Code of Student Conduct <http://studentlife.osu.edu/csc/>.

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, Kellie Brennan, at titleix@osu.edu

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 Younkin 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 through the 24/7 National Suicide Prevention Hotline at 1-800-273- TALK or at suicidepreventionlifeline.org

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>

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](#)

Tentative Course schedule

There are nominally 14 weeks in the semester, but the lectures are spread over 16 weeks. The plan below is tentative. Expect departures from the rough guide below as we spend a little more time or a little less time on particular parts of the material. We will cover some material that is not in the text.

For details of assignments, see Carmen.

Week	Reading assignment (Casella and Berger)
1	Sections 1.1 – 1.2.2
2	Sections 1.2.3 – 1.4
3	Sections 1.5 – 1.6
4	Sections 2.1 – 2.3
5	Sections 2.3 – 2.4
6	Sections 3.1 – 3.3
7	Sections 3.4 – 3.5
8	Sections 3.6; 3.8.1, part of 3.8.2
9	Sections 4.1 – 4.2
10	Sections 4.3 – 4.4
11	Sections 4.5 – 4.7
12	Sections 5.1 – 5.2
13	Sections 5.3 – 5.5
14	Sections 6.1 – 6.2
15-16	Section 6.3

Disclaimer

This syllabus should be taken as a fairly reliable guide for the course content. However, you cannot claim any rights from it. In particular, I reserve the right to change due dates or the methods of grading and/or assessment if necessary.

Copyright disclaimer

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.