



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 6801 STATISTICAL THEORY I AUTUMN 2020

COURSE OVERVIEW

Instructor

Instructor: Steve MacEachern

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Phone number: 614 292-5843

Office hours: Office hours will be held virtually via Carmen Zoom. Days and times of the office hours will be announced in class. You may also see me in person in my office.

Office Location: 404B Cockins Hall

Grader or Teaching Assistant

Grader: Pashmeen Kaur

Email address: kaur.138@buckeyemail.osu.edu

Office hours: To be announced

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 technology

This course is not technology heavy. The current plan is to offer the course in person. Depending on events during the semester, this may change. In preparation for the possibility of a change, you should (i) be familiar with Carmen, The Ohio State University's course management system, (ii) develop the ability to submit homework/quizzes/exams directly to Carmen (i.e., in electronic format), and (iii) have the ability to work with Carmen Zoom. You will develop skill in areas (i) and (ii) as the term progresses (see below).

For help with your password, university e-mail, Carmen, or any other technology issues, questions, or requests, contact the OSU IT Service Desk. Standard support hours are available at <https://ocio.osu.edu/help/hours>, and support for urgent issues is available 24x7.

- **Self-Service and Chat support:** <http://ocio.osu.edu/selfservice>
- **Phone:** 614-688-HELP (4357)
- **Email:** 8help@osu.edu
- **TDD:** 614-688-8743

Necessary equipment for Carmen Zoom

- Computer: current Mac (OS X) or PC (Windows 10+) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed
- Microphone: built-in laptop or tablet mic or external microphone

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%

Quizzes – 50%

Final Exam – 30%

Your lowest quiz grade will be dropped before computing your quiz score. Your lowest two homework assignments will be dropped before computing your homework score. If you miss a quiz or 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.

Quizzes will be 20 minutes in length. The initial plan is to have quizzes during class, though this plan is subject to change. There will be several quizzes as a replacement for midterm exams.

Late assignments

Assignments will be due at the time posted on Carmen. With few exceptions, late assignments 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 for 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

Health and safety

The Ohio State University Wexner Medical Center's Coronavirus Outbreak site (<https://wexnermedical.osu.edu/features/coronavirus>) includes the latest information about COVID-19 as well as guidance for students, faculty and staff.

The university has training (Together as Buckeyes and the Buckeye Pledge) that is intended to keep all of us safe.

- **Remember to complete your daily health check and remember to self-isolate if you are running a fever or are symptomatic**
- **Remember to observe university expectations on mask wearing and social distancing in classrooms and elsewhere on campus**
- **In the event of non-compliance with university-sanctioned procedures (e.g., not wearing a mask or not social distancing), you may be asked to leave the class**

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 quizzes and exam, you are to work solely on your own.

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/>.

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.

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

Accessibility accommodations for students with disabilities

The university strives to make all learning experiences as accessible as possible. In light of the current pandemic, students seeking to request COVID-related accommodations may do so through the university's request process, managed by Student Life Disability Services. 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. SLDS contact information: slds@osu.edu; 614-292-3307; <http://slds.osu.edu>; 098 Baker Hall, 113 W. 12th Avenue.

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

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.

Tentative Course schedule

There are nominally 14 weeks in the semester, but the lectures are spread over 15 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	Section 6.3