



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

# SYLLABUS: STAT 6301

## PROBABILITY FOR STATISTICAL INFERENCE

### AUTUMN 2020

## Course overview

### Instructor

Instructor: Dena M. Asta

Email address: [dasta@stat.osu.edu](mailto:dasta@stat.osu.edu)

Lectures: On CarmenZoom, Monday, Wednesday, and Friday 11:30am-12:25pm (some of these lectures will be presented asynchronously; see *Course delivery* below)

Office hours: Virtual Hours via Carmen Zoom: Mondays 10:30-11:25am and Thursdays 2:00-3:00pm

### Grader

Lauren Contard

[contard.1@osu.edu](mailto:contard.1@osu.edu)

### Course description

Statistics 6301 is an introductory course on probability, random variables, and distribution theory intended for students in the Statistics MAS degree program. The course will quickly cover the basic concepts of sample spaces, probability, random variables and their distributions.

Afterwards, the course will cover more advance topics, such as moment-generating functions and probability inequalities. Building on these, we will lastly cover convergence concepts and limit theorems.

Prerequisites: Statistics 4547 (548), or permission of instructor.

## Course learning outcomes

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

- Understand the concept of, and be familiar with common examples of, random variables
- Understand in depth common distributions
- Calculate/understand expectation, (co)variance, conditional expectation, and moment-generating functions
- Understand the Law of Large Numbers and the Central Limit Theorem, and be able to apply both in proofs

## Course materials

### Required

Mathematical Statistics and Data Analysis (Third Edition) by John Rice.

Note: International edition has different exercises problems and is therefore not recommended

## Course technology

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](mailto:8help@osu.edu)
- **TDD:** 614-688-8743

### Baseline technical skills necessary for online courses

- Basic computer and web-browsing skills
- Navigating Carmen

### Technology skills necessary for this specific course

- CarmenZoom

### Necessary equipment

- 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

Each week the instructor will deliver live CarmenZoom lectures during the allotted class time. The lectures will be recorded and posted on the class website soon after. The instructor may elect to prerecord several lecture videos that will be posted on the course website.

Each week we will cover approximately 165 minutes of content in total. You will be responsible for watching any live CarmenZoom lectures or recorded videos and studying the material that is assigned. In addition to the lectures, weekly assignments will be posted on the class website. You will be given ample time to complete the assignments.

The instructor will hold weekly office hours via CarmenZoom. The times are given above.

## Grading and faculty response

### Homework and exams

Assignment or category	Percentage
Homework	20
Midterm Exam I	20
Midterm Exam II	20
Final Exam	40
<b>Total</b>	<b>100</b>

Grades will be recorded on the class website.

**Homework** will be due at the beginning of class on the day it is due (11.30am). Typically, no late homework will be accepted. You are encouraged to work together on the homework, but do not copy any part of a homework. Each student must produce his/her own homework to be handed in. All homework must be submitted online as a PDF file through the class website. Feel free to ask me for help after you have made an attempt of the questions.

The grader for the course does not have the time to provide detailed explanations on each question that is graded. To make up for this, I will endeavor to create homework solutions that are detailed enough to allow you to understand how the question could be approached.

**Homework preparation rules:** Put your name and the homework assignment number on the top right-hand corner of every page. Submit the problems in order showing all your work.

**Exams:** There will be two midterms and one final exam:

Midterm 1      tentatively on September 21<sup>st</sup> (Monday) from 11:30am-12:25pm

Midterm 2      tentatively on October 21<sup>st</sup> (Wednesday) from 11:30am-12:25pm

Final            December 11<sup>th</sup> (Friday) from 10:00am-11:45am

All exams are **closed book/closed notes** and will be **proctored online** – there are no make-up exams. Further details will be given in advance of each exam. A basic calculator is allowed – tablets, laptops, cellphones, and other communication devices are not.

The first midterm covers the material up to and including Friday September 18<sup>th</sup>. The second midterm covers the material up to and including Monday October 19<sup>th</sup>. The final will cover all the material for the course.

## Faculty feedback and response time

I am providing the following list to give you an idea of my intended availability throughout the course. (Remember that you can call **614-688-HELP** at any time if you have a technical problem.)

### Grading and feedback

For weekly assignments, you can generally expect feedback within **7-10 days**.

### E-mail

I will reply to e-mails within **48 hours on school days**.

## Attendance, participation, and discussions

Students may miss class, for a variety of reasons related to COVID-19. As much as possible, please stay in contact with the instructor so that we can discuss accommodations should they be needed.

## Student participation requirements

Because this is a distance-education course, your attendance is based on your online activity and participation. The following is a summary of everyone's expected participation:

- **In live lectures:**  
Students will be expected to participate, discuss, and answer questions in online live lectures.
- **Logging in: AT LEAST THREE TIMES PER WEEK**  
Be sure you are logging in to the course in Carmen each week, including weeks with holidays. (During most weeks you will probably log in many times.) If you have a situation that might cause you to miss an entire week of class, discuss it with me *as soon as possible*.
- **Office hours: OPTIONAL OR FLEXIBLE**  
All office hours are optional. If you are required to discuss an assignment with me, please contact me at the beginning of the week if you need a time outside my scheduled office hours.

## Discussion and communication guidelines

The following are my expectations for how we should communicate as a class. Above all, please remember to be respectful and thoughtful.

- **Writing style:** While there is no need to participate in class discussions as if you were writing a research paper, you should remember to write using good grammar, spelling, and punctuation. Informality (including an occasional emoticon) is fine for non-academic topics.
- **Tone and civility:** Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably. Remember that sarcasm doesn't always come across online.
- **Citing your sources:** When we have academic discussions, please cite your sources to back up what you say. (For the textbook or other course materials, list at least the title and page numbers. For online sources, include a link.)
- **Backing up your work:** Consider composing your academic posts in a word processor, where you can save your work, and then copying into the Carmen discussion.

## 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. Guidelines and requirements for campus safety from the University's COVID-19 Transition Task Force were published on July 1 on the Safe and Healthy website (<https://safeandhealthy.osu.edu>).

## Potential disruptions to instruction

- As much as is possible, students will have access to material online if they are unable to attend class because of positive diagnosis, symptoms, or quarantine required following contact tracing.
- If the instructor is unable to be present in person because of positive diagnosis, symptoms, or quarantine following contact tracing a new instructor will be assigned to the course. Details will be given on the course website.

## Student academic services

Student academic services offered on the OSU main campus  
<http://advising.osu.edu/welcome.shtml>.

## Student support services

Student support services offered on the OSU main campus <http://ssc.osu.edu>.

## Academic integrity policy

### Policies for this online course

- **Exams:** You must complete the midterms and final exams yourself, without any external help or communication.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work.
- **Reusing past work:** In general, you are prohibited in university courses from turning in work from a past class to your current class, even if you modify it. If you want to build on past research or revisit a topic you've explored in previous courses, please discuss the situation with me.
- **Falsifying research or results:** All research you will conduct in this course is intended to be a learning experience; you should never feel tempted to make your results or your library research look more successful than it was.
- **Collaboration and informal peer-review:** The course will include opportunities for formal collaboration with your classmates. While study groups are encouraged, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

## 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. 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/>.

## 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](mailto:titleix@osu.edu)

## Accessibility accommodations for students with disabilities

The University strives to make all learning experiences as accessible as possible. 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](mailto:slds@osu.edu); 614-292-3307; [slds.osu.edu](http://slds.osu.edu); 098 Baker Hall, 113 W. 12th Avenue.

### Accessibility of course technology

This online course requires use of Carmen (Ohio State's learning management system) and other online communication and multimedia tools. If you need additional services to use these technologies, please request accommodations with your instructor.

- [Carmen \(Canvas\) accessibility](#)
- Streaming audio and video
- Synchronous course tools

## 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](http://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](http://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 and in particular we reserve the right to change due dates or the methods of grading and/or assessment if necessary. Any changes will be communicated to you through official course announcements.

## Course schedule (tentative)

Week	Dates	Topics, Readings, Assignments, Deadlines
1	8/24-8/28	Chapter 1: Sample space and probability
2	8/31-9/4	Chapter 1: Sample space and probability (Homework 1 due 9/2)
3	9/7-9/11	Chapter 2: Univariate random variables (Homework 2 due 9/11)
4	9/14-9/18	Chapter 2: Univariate random variables (Homework 3 due 9/18)
5	9/21-9/25	Chapter 2&3: Univariate random variables & Joint distributions (Homework 4 due 9/25)
6	9/28-10/2	Chapter 3: Joint distributions (Homework 5 due 10/2)
7	10/5-10/9	Chapter 3: Joint distributions (Homework 6 due 10/9)
8	10/12-10/16	Chapter 3&4: Joint distributions & Expectations and variances (Homework 7 due 10/16)
9	10/19-10/23	Chapter 4: Expectations and variances (Homework 8 due 10/23)
10	10/26-10/30	Chapter 4: Expectations and variances (Homework 9 due 10/30)
11	11/2-11/6	Chapter 4&5: Expectations and variances & Law of large numbers and central limit theorem (Homework 10 due 11/6)
12	11/9-11/13	Chapter 5: Law of large numbers and central limit theorem (Homework 11 due 11/13)
13	11/16-11/20	Chapter 5: Law of large numbers and central limit theorem (Homework 11 due 11/20)

14	11/23-12/4	<b>Chapter 6: Normal-derived distributions (Homework 12 due 12/4)</b>
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