SYLLABUS
STAT 4201

Principles of Data Collection and Analysis
Autumn 2021 (full term)
4 credit hours
Online

COURSE OVERVIEW

Instructor

Instructor: Dr. Andrew Richards

Email address: Richards.1227@osu.edu (preferred contact method)

Phone number: TBD

Office hours: TBD

Prerequisites

C- or better in Math 2153, 2162.xx, 2182H, or 4182H, or permission of instructor. Not open to students with credit for 3201, 4202, 6201, 6301, 6801, Math 4530 or 5530H.

Course description

This is the first course in a two-semester sequence on probability and mathematical statistics. The focus of STAT 4201 will be on introducing some of the basic concepts in probability theory. Topics to be covered include basic counting, set theoretic notation, the axioms of probability spaces, discrete and continuous distributions and densities, random variables, expectation and moments, functions of random variables and transformation techniques, common sampling distributions, and order statistics. These topics are covered in the first 8 chapters of the required textbook.

Course learning outcomes

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

- Understand the basic concepts in probability and statistics.

- Compute probabilities and statistics of discrete and continuous distributions.
- Comprehend the probabilistic methods needed to analyze and critically evaluate statistical models and arguments.
- Recongnize the importance of statistical ideas.

HOW THIS ONLINE COURSE WORKS

Mode of delivery: The instructor will deliver live CarmenZoom lectures during the scheduled class time. Lectures will be recorded and posted on the class website soon after. In addition to the lecture videos, 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 and in person. The dates and times will be announced later and posted on the Carmen website. I am usually available to meet either in person or online by appointment if arrangements are made in a timely manner.

Synchronous attendance of lectures is **highly encouraged** but not required, as they will be recorded; however, midterm and final exams must be written synchronously. Material covered in the text should be read **in advance of the lecture**.

Each week, a recitation activity (usually a set of problems) will be posted on the course webpage. The recitation activities will typically be accompanied by live CarmenZoom interactions for group work moderated by the TA (which may not be recorded) and other educational materials.

The tutor hours of the TAs can be accessed through the Math and Statistics Learning Center(MSLC). The Math and Statistics Learning Center (MSLC) will be open beginning the second week of classes. Details about how Zoom tutoring will work through the MSLC, along with the MSLC Zoom link, can be found on the following site: https://mslc.osu.edu/online-tutoring. Hours in which STAT 4201 assistance will be available through the MSLC will be posted on Carmen before the start of Week 2 of the semester. Essentially, you can think of the MSLC hours as times when our teaching assistants will be available to provide you with one-on-one assistance with the course content. We strongly encourage you to take advantage of this resource.

Pace of online activities: This course is divided into **weekly modules** that are released one week ahead of time. Students are expected to keep pace with weekly deadlines but may schedule their efforts freely within that time frame.

Credit hours and work expectations: This is a **4-credit-hour course**. According to Ohio State policy (go.osu.edu/credithours), students should expect around 4 hours per week of time spent on direct instruction (instructor content and Carmen activities, for example) in addition to 8 hours of homework (reading and assignment preparation, for example) to receive a grade of (C) average.

Attendance and participation requirements: Because this is an online course, your attendance is based on your online activity and participation. The following is a summary of students' expected participation:

- **Participating in online activities for attendance**: **AT LEAST ONCE PER WEEK**
  You are expected to log in to the course in Carmen every week. (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 and live sessions**: **OPTIONAL**
  All live, scheduled events for the course, including my office hours, are optional.

COURSE MATERIALS AND TECHNOLOGIES

Textbooks

Required

- *John E. Freund's Mathematical Statistics with Applications*, 8th edition, by Irwin Miller and Marylees Miler, Pearson, 2014

The textbook for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through CarmenCanvas. The fee for this material is included as part of tuition and is listed as CarmenBooks fee on your Statement of Account. Materials provided through CarmenBooks are available immediately on or before the first day of class.

Unless you choose to opt-out of the program, you do NOT need to purchase any materials for this course at the bookstore. For more information on the program or information on how to opt out, please visit the CarmenBooks website.

Access this eBook through the CarmenBooks reader link in the course navigation.

Course technology

Technology support

For help with your password, university email, Carmen, or any other technology issues, questions, or requests, contact the Ohio State IT Service Desk. Standard support hours are available at ocio.osu.edu/help/hours, and support for urgent issues is available 24/7.

- **Self-Service and Chat support:** ocio.osu.edu/help
- **Phone:** 614-688-4357(HELP)
- **Email:** servicedesk@osu.edu

- **TDD:** 614-688-8743

Technology skills needed for this course

- Basic computer and web-browsing skills
- Navigating Carmen (go.osu.edu/canvasstudent)
- CarmenZoom virtual meetings (go.osu.edu/zoom-meetings)
- Recording a slide presentation with audio narration (go.osu.edu/video-assignment-guide)
- Recording, editing, and uploading video (go.osu.edu/video-assignment-guide)

Required equipment

- Computer: current Mac (MacOs) or PC (Windows 10) with high-speed internet connection
- Webcam: built-in or external webcam, fully installed and tested
- Microphone: built-in laptop or tablet mic or external microphone
- Other: a mobile device (smartphone or tablet) to use for BuckeyePass authentication

Required software

- You will need to have the ability to scan written work to upload certain assignments as PDF files through Carmen. There are a variety of free apps that can do this (search for "PDF scanner"). For instance, the Notes application that comes standard on an iPhone or iPad has this capability. Alternatively, you may use a tablet computer with a stylus to write your solutions using a handwriting app, then save them as a PDF file to upload to Carmen.

- Microsoft Office 365: All Ohio State students are now eligible for free Microsoft Office 365. Full instructions for downloading and installation can be found at go.osu.edu/office365help.

Carmen access

You will need to use BuckeyePass (buckeyepass.osu.edu) multi-factor authentication to access your courses in Carmen. To ensure that you are able to connect to Carmen at all times, it is recommended that you take the following steps:
- Register multiple devices in case something happens to your primary device. Visit the BuckeyePass - Adding a Device help article for step-by-step instructions (go.osu.edu/add-device).
- Request passcodes to keep as a backup authentication option. When you see the Duo login screen on your computer, click **Enter a Passcode** and then click the **Text me new codes** button that appears. This will text you ten passcodes good for 365 days that can each be used once.
- Download the Duo Mobile application (go.osu.edu/install-duo) to all of your registered devices for the ability to generate one-time codes in the event that you lose cell, data, or Wi-Fi service

If none of these options will meet the needs of your situation, you can contact the IT Service Desk at 614-688-4357(HELP) and IT support staff will work out a solution with you.

GRADING AND FACULTY RESPONSE

How your grade is calculated

ASSIGNMENT CATEGORY	POINTS
Homework	15
Lab	15
Exam 1	15
Exam 2	15
Exam 3	15
Final Exam	25
Total	**100**

See course schedule below for due dates.

Descriptions of major course assignments

Homework

Description: Homework will be assigned weekly, or in some cases biweekly (generally when there is a short week due to holidays or exams). It will consist of mostly textbook-style problems, problems motivated by real-world applications, and analyses requiring the use of statistical software. Homework must be uploaded to Carmen at the beginning of class on the due date. The solutions may be handwritten and scanned, entered directly into a tablet, or typed. **All work and software output must be uploaded as a single pdf file**.

Put your name and the homework assignment number on the top right corner of every page. Submit the problems in order. The purpose of the written homework is to assess and provide feedback on your understanding of and ability to explain the reasoning behind complex derivations or probabilistic arguments, which are difficult to assess via a Carmen quiz. **Therefore, answers with little or no explanation or work shown will receive no credit.** For the homeworks as well the exams, your solution should be clear and detailed to explain your understanding of the course.

While grading the homeworks, it may not be possible for us 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.

Academic integrity and collaboration: You may work together on assignment problems, but each student must hand in his or her own work, written in his or her own words. Do not copy any part of another student's homework including computer code or output. Use of homework solutions distributed in previous offerings of the course or available on the web constitutes academic misconduct and will be handled according to university rules. Sharing or disseminating solutions, or in any way knowingly enabling others to commit academic misconduct also constitutes academic misconduct, and will be reported. If you have any questions about what is allowed, **please ask.**

Recitation lab activities

Description: Weekly lab activities will be completed in recitation. These are designed so you can work on difficult problems together and under the guidance of your TA. These problems will be designed to run the range from simpler problems for gaining experience to challenging problems that may exceed the difficulty of exam questions

Academic integrity and collaboration: You are encouraged to work together with your fellow students and seek help from your TA.

Exams

Description: There will be three midterm exams and one final exam.

Academic integrity and collaboration: You must complete the midterm and final exams yourself, **without any external help or communication**. **Again, answers with little or no explanation or work shown will receive no credit.** You may use your notes and the textbook. Students are **strongly advised** to prep a formula highlight sheet in advance.

Late assignments

Assignment solutions will be posted shortly after submission. No late assignments will be accepted without prior permission or formal documentation. Please refer to Carmen for due dates. Accommodations can be made in case of severe illness, so please notify me as soon as possible if this situation arises.

Grading scale

93–100: A
90–92.9: A-
87–89.9: B+

83–86.9: B
80–82.9: B-
77–79.9: C+
73–76.9: C
70 –72.9: C-
67 –69.9: D+
60 –66.9: D
Below 60: E

Instructor 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 **614-688-4357(HELP)** at any time if you have a technical problem.)

- **Grading and feedback:** For large weekly assignments, you can generally expect feedback within **7 days**.

- **Email:** I prefer to communicate via email (Richards.1227@osu.edu **not** @buckeyemail.osu.edu). **Please write "STAT 3410" somewhere in the subject line**, as this will help me to quickly identify and reply to class emails. It is reasonable to expect a response within **one business day**.

- **Discussion board:** I will check and reply to messages in the discussion boards every **24 hours on school days**.

OTHER COURSE POLICIES

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. A more conversational tone 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.

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)

Student Services and Advising

University Student Services can be accessed through BuckeyeLink. More information is available here: https://contactbuckeyelink.osu.edu/

FOR UNDERGRAD COURSES: Advising resources for students are available here: http://advising.osu.edu

FOR GRADUATE COURSES: List your department's advising resources here.

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. A good faith effort has been made to cite work inherited from past instructors appropriately, except when the citation has been withheld for pedagogical reasons (to prevent students from looking up the answers).

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 Greeneville 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 learn, 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. No matter where you are engaged in distance learning, The Ohio State University's Student Life Counseling and Consultation Service (CCS) is here to support you. If you find yourself feeling isolated, anxious or overwhelmed, on-demand resources are available at go.osu.edu/ccsondemand. 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 Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org. The Ohio State Wellness app is also a great resource available at go.osu.edu/wellnessapp.

ACCESSIBILITY ACCOMMODATIONS FOR STUDENTS WITH DISABILITIES

Requesting accommodations

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; 614-292-3307; 098 Baker Hall, 113 W. 12th Avenue.

Accessibility of course technology

This online course requires use of CarmenCanvas (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.

- Canvas accessibility (go.osu.edu/canvas-accessibility)
- Streaming audio and video
- CarmenZoom accessibility (go.osu.edu/zoom-accessibility)
- Collaborative course tools

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.

ACKNOWLEDGEMENT

COURSE SCHEDULE

Refer to the Carmen course for up-to-date assignment due dates.

Week	Dates	Topics, Readings, Assignments, Deadlines
1	8/25-8/27	Basic counting, axioms of probability (1, 2.1-2.4)
2	8/30-9/3	Conditional probability, Independent events, Bayes Theorem (2.5-2.8) Random variables, probability distributions (3.1-3.2)
3	9/8-9/10	Continuous random variables, probability density functions, multivariate distributions (3.3-3.5)
4	9/13-9/17	Marginal and conditional distributions (3.6-3.7) Expected value, moments and Markov/Chebyshev inequalities (4.1-4.4)
5	9/20-9/24	Moment-generating functions, Product moments, Moments of linear combinations (4.5-4.7)
6	9/27-10/1	Conditional expectation (4.8) Discrete distributions: Uniform and Bernoulli (5.1-5.3)
7	10/4-10/8	Discrete distributions: Binomial, Negative Binomial, Geometric, Hypergeometric, Multivariate Hypergeometric (5.4-5.6, 5.9)
8	10/11-10/13	Discrete distributions: Poisson, Multinomial (5.7-5.8)
9	10/18-10/22	Probability density functions: Uniform, Gamma, Exponential, Chi - square, Beta, Weibull, Pareto (6.1-6.4)
10	10/25-10/29	Normal distribution, Normal approximation to Binomial, Bivariate normal (6.5-6.7)
11	11/1-11/5	Functions of random variables: distribution functions, single variable transformations (7.1-7.3)
12	11/8-11/12	Transformation techniques: several variables and moment generating functions (7.4-7.5)
13	11/15-11/19	Sampling distributions, Sampling distribution of the mean, Central Limit Theorem (8.1-8.3)
14	11/22-12/3	Distribution of mean in finite populations, Chi-square distribution

Week	Dates	Topics, Readings, Assignments, Deadlines
		(8.3- 8.4)
15	12/6-12/8	t-distribution, F-distribution, Order Statistics (8.5-8.7)