



# THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

## **SYLLABUS: STAT 3410** **PRINCIPLES OF DATA COLLECTION AND ANALYSIS** **AUTUMN 2020**

### **Course overview**

#### **Instructor**

Instructor: Dr. O.A. Chkrebtii, Associate Professor in the Department of Statistics

Email address: Chkrebtii.1@osu.edu

Phone number: 614-292-0292

Office hours: Virtual Hours via Carmen Zoom (see Carmen page for Zoom link) will be held on:

- Thursdays 1-2 p.m.
- Fridays 4-5 p.m.

#### **Course**

Online lectures: Mondays, Wednesdays, Fridays 3:00 p.m. - 3:55 p.m. (recordings will be made available on Carmen, but attendance to the live lecture is recommended if possible)

#### **Grader**

Poulami Chakraborty (chakraborty.121@osu.edu)

Zhizhen Zhao (zhao.3053@osu.edu)

MSLC virtual office hours for the teaching assistants are (see Carmen page for zoom link):

- Monday: 11:30 a.m. -12:30 p.m.
- Tuesday: 4:10-5:10 p.m., 5:20-6:20 p.m.
- Wednesday: 12:40-1:40 p.m., 4:10-5:10 p.m.
- Thursday: 4:10-5:10 p.m., 5:20-6:20 p.m.

## Course description

This course covers principles of data collection and data analysis. The course introduces students to the primary ideas involved in designed vs. observational studies, and considers appropriate statistical methods for each. It also covers the basic principles of experimental design and the techniques used to analyze experiments that follow standard experimental designs. Specific designs to be covered include one-way ANOVA, two-and-higher-way ANOVA, factorial designs, block designs, and models with random effects. The JMP software will be used in the course to carry out all analyses and to provide experience to students in data analysis.

## Course learning outcomes

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

- Grasp the basics of descriptive and inferential statistics for designed experiments and observational studies
- Understand principles of good design, such as randomization, replication, and blocking
- Appreciate the importance of the assumptions that statistical models are based on
- Understand and use appropriate statistical notation and terminology
- Understand the fundamental components of ANOVA models (e.g., main effects and interactions)
- Effectively implement statistical analyses for designed experiments in the JMP software
- Summarize an analysis appropriately

## Course materials

### Required

Design and Analysis of Experiments, 9th edition, by Douglas C. Montgomery, Wiley, 2017 (print)

## 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
- Scanning and uploading a written document to Carmen

## 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
- Camera and/or scanner or tablet functionality: ability to scan, photograph, or write directly on a tablet and upload documents to Carmen

## Necessary software

- We will be using the JMP statistical computing software, which is available free of charge to students (see <https://ocio.osu.edu/software/software-request-instructions>).
- [Microsoft Office 365 ProPlus](#) All Ohio State students are now eligible for free Microsoft Office 365 ProPlus through Microsoft's Student Advantage program. Each student can install Office on five PCs or Macs, five tablets (Windows, iPad® and Android™) and five phones.
  - Students are able to access Word, Excel, PowerPoint, Outlook and other programs, depending on platform. Users will also receive 1 TB of OneDrive for Business storage.
  - Office 365 is installed within your BuckeyeMail account. Full instructions for downloading and installation can be found <https://ocio.osu.edu/kb04733>.

## Course 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. The dates and times will be announced later and posted on the Carmen website. The instructor will also initiate and manage active discussion boards, also via Carmen.

Synchronous attendance of lectures is encouraged but not required, as they will be recorded; however, midterm and final exams must be written synchronously.

## Grading and faculty response

### Grades

Assignment or category	Percentage
Homework	30
Exam 1	15
Exam 2	15
Exam 3	15
Final Exam	25
<b>Total</b>	<b>100</b>

*See course schedule, below, for due dates*

### Assignment information

Homework will be assigned approximately biweekly. It will consist of mostly textbook-style problems, problems motivated by real-world applications, and analyses requiring the use of statistical software. 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. 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. Any software output must appended to the homework file prior to submission. **All work and software output must be uploaded as a single pdf file.** Please be sure that the questions are clearly labeled, all supporting work (including software output) can be easily identified, and that all figures/tables are referenced and interpreted in the text.

## Late assignments

Assignment solutions will be posted shortly after submission. No late assignments will be accepted without prior permission or formal documentation. The lowest homework grade will be dropped for each student. 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

## 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 large biweekly assignments, you can generally expect feedback within **7 days**.

### E-mail

I prefer to communicate via email ([chkrebtii.1@osu.edu](mailto:chkrebtii.1@osu.edu)) rather than using the Carmen email tool. **Please write “STAT 3410” somewhere in the subject line**, as this will help me to quickly identify and reply to class emails. Due to the large volume of emails, I will to reply to e-mails within **48 hours on school days**.

### Discussion board

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

# Attendance, participation, and discussions

## 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:

- **Logging in: AT LEAST ONCE PER WEEK**  
Be sure you are logging in to the course in Carmen each week, including weeks with holidays or weeks with minimal online course activity. (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 OR FLEXIBLE**  
All live, scheduled events for the course, including my office hours, are optional. For live presentations, I will provide a recording that you can watch later. 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.

## Potential disruptions to instruction

Contingencies to be addressed:

- Student is unable to attend class because of positive diagnosis, symptoms, or quarantine required following contact tracing
- Entire class is required to quarantine following contact tracing
- In-person classes are suspended at the university
- Instructor is unable to be present in person because of positive diagnosis, symptoms, or quarantine following contact tracing

## 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 midterm and final exams yourself, without any external help or communication. Weekly quizzes are included as self-checks without points attached.
- **Written assignments:** Your written assignments, including discussion posts, should be your own original work. In formal assignments, you should follow APA style to cite the ideas and words of your research sources. You are encouraged to ask a trusted person to proofread your assignments before you turn them in--but no one else should revise or rewrite your 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 includes many opportunities for formal collaboration with your classmates. While study groups are allowed, 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)

<b>Week</b>	<b>Topics, Readings, Assignments, Deadlines</b>
<b>1</b>	<b>Orientation, course introduction; review of basic principles of statistical inference</b>
<b>2</b>	<b>Review of basic principles of statistical inference; introduction to JMP</b>
<b>3</b>	<b>Designed experiments vs observational studies; Principles of experimental design</b>
<b>4</b>	<b>Principles of experimental design; Designs with one source of variation</b>
<b>5</b>	<b>Checking model assumptions</b>
<b>6</b>	<b>Designs with one source of variation, sample size determination</b>
<b>7</b>	<b>Designs with one source of variation, sample size determination; Inferences about contrasts and treatment means</b>
<b>8</b>	<b>Inferences about contrasts and treatment means</b>
<b>9</b>	<b>Experiments with multiple crossed treatment factors</b>
<b>10</b>	<b>Experiments with multiple crossed treatment factors</b>
<b>11</b>	<b>Experiments with multiple crossed treatment factors; Fitting multi-factor models in JMP</b>
<b>12</b>	<b>Block designs</b>
<b>13</b>	<b>Block designs</b>
<b>14</b>	<b>Additional topics</b>