THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 6910
APPLIED STATISTICS II - SPRING 2025

Course overview

Instructor

Instructor: Oksana Chkrebtii, Associate Professor, Department of Statistics
Email address: Chkrebtii.1@osu.edu (best method to contact me)
Phone number: 614-292-0292

Instructor office hours:

- Thursdays, 11:00 am – 12:00 pm in Cockins Hall (CH) 425
- By appointment (please email me with your available time slots in the following few business days – don't forget to include the course number in the email subject)

Course

In-person lectures: Tuesdays and Thursdays from 9:05am to 10:55pm in Room 285 of the 209 W 18th Avenue Building.

Grader

Qian Zhou (Zhou.3132@buckeyemail.osu.edu)

Prerequisites

Statistics 6801 and Statistics 6950, or permission of instructor. Not open to students who have taken Statistics 6410.

Course description

Statistics 6910 is a course on applied statistics. It will quickly cover material on categorical data and inference for proportions. The course then covers an introduction to generalized linear models (GLM), including binomial regression and Poisson regression. Following the introductory material, we will move on to experimental design. We will cover the basic principles of design and the techniques used to analyze experiments that follow standard experimental designs. Specific designs to be covered include one-way analysis of variance (ANOVA), two-and-higher-way ANOVA, analysis of covariance (ANCOVA), block designs, random and mixed effect models.

Course learning outcomes

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

- Grasp the basics of descriptive and inferential statistics from an applied perspective;
- Fit, interpret, and perform statistical inference based on common generalized linear regression models;
- Describe, estimate and interpret variance components;
- Appreciate the importance of the assumptions that the models are based on;
- Make sound decisions for an analysis and recommendations for study design;
- Understand and use appropriate statistical notation and terminology;
- Implement formal techniques flawlessly;
- Summarize an analysis appropriately.

Course materials

Required

Course notes are based on material from the following texts. More references are available upon request. The reading list and homework problems will be from the course textbooks:

- S. Weisberg (2014), *Applied Linear Regression* (ALR), 4th Edition, John Wiley & Sons, Inc., NJ. An electronic version of the book can be accessed for free through The Ohio State University Libraries (you may need to supply your OSU credentials). The online resource is best suited for screen reading; each individual is allowed to print/e-mail/save/download a limited number of pages. Errata and more information about the textbook can be found at http://users.stat.umn.edu/~sandy/alr4ed/.

- M. Dean, D. Voss, and D. Draguljic (DVD) (2017), *Design and Analysis of Experiments*, 2nd Edition, Springer, NY. An electronic version of the book can be accessed for free through The Ohio State University Libraries**.** Errata and datasets available from http://www.wright.edu/~dan.voss/DeanVossDraguljic.html.

I will highlight other useful references as the course progresses.

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
- **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 (in case the need arises for a remote lecture)
- Scanning and uploading a written document to Carmen

Necessary equipment

- Computer: current Mac (OS X) or PC (Windows 10+)
- Camera and/or scanner or tablet functionality: ability to scan, photograph, or write directly on a tablet and upload documents to Carmen

Necessary software

- This class requires you to use the statistical software package called R (The R Project for Statistical Computing; http://www.r-project.org/). This software package is available as Free Software.
    - You can download R for Windows, Mac, and Linux, from the CRAN archive at https://cran.r-project.org.
    - An in-depth introduction to R is available at http://cran.r-project.org/doc/manuals/R-intro.pdf
    - Hands-on tutorials are available in the Swirl system, which you can learn about at http://swirlstats.com/. In particular, “R Programming: The basics of programming in R” is an appropriate first tutorial for students who have never used R.

- An easier to use interface to R is available in the software package RStudio. This package is available for Windows, Mac, and Linux and can be downloaded for free from http://rstudio.org. **Note that RStudio requires R to be installed.**
- 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

This class will take place in person. Lectures will include a mix of slides and software demonstrations. Partial slides will be provided via Carmen to be filled in by students during the lectures.

All assignments will be posted on the Carmen course page. Office hours will be held in person. Zoom meetings will be available upon request as well.

In case of instructor illness or other emergency, a lecture may be changed to online delivery. The instructor will provide as much notice as possible of any such changes via email and on Carmen. Every attempt will be made to provide a synchronous online lecture, which will also be recorded and posted online.

Grading and faculty response

Grades

Assignment or category	Percentage
Homework	**15**
Test 1	**25**
Test 2	**25**
Final Exam	**35**
Total	**100**

Assignment information

Homework will be assigned approximately weekly (check Carmen for exact due dates). 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 to COAM**. Homework must be uploaded to Carmen by the due date.

You may ask the instructor or the GTA for help after you have attempted the questions. I will endeavor to create homework solutions that are detailed enough to allow you to understand how the question could be approached.

The solutions may be handwritten (legibly) and scanned, entered directly into a tablet, or typed. Submit the problems in order, clearly numbered, making sure that the computer output and discussion are placed together (do not put computer code at the end). **Homework must be uploaded as a single pdf file**.

Late assignments

Late assignments will typically not be accepted without prior permission or appropriate documentation. Accommodations can be made in case of emergency, so please notify me as soon as possible if this situation arises.

Midterm exams

Check the Carme page for exam dates. All exams will be closed book/closed notes. A basic calculator is allowed – tablets, laptops, cellphones, and communication devices are not. There are no make-up exams. Contact me as soon as possible if there is an event that prevents you from taking an exam on the scheduled day/time. Further details will be given in advance of each exam.

Course Schedule (tentative)

Week	Topic	Reading
1	Introduction to categorical data Simpson/Yule paradox Inference for proportions	Class notes
2	Binomial regression, residuals, and diagnostics	ALR4, Sections 12.1–12.2
3	Binomial regression, residuals, and diagnostics Poisson regression and goodness of fit	ALR4, Sections 12.2–12.5
4	Poisson regression and goodness of fit Principles of designing experiments (causal vs. observational experiments)	ALR4, Sections 12.3–12.5 DVD Chapters 1 and 2
5	One-way ANOVA	DVD, Sections 3.1-3.6
6	One-way ANOVA Midterm 1	DVD, Sections 3.1-3.5, 4.1-4.3
7	One-way ANOVA	DVD, Sections 4.1-4.3, Chapter 5
8	Two-way ANOVA	DVD, Sections 6.1-6.7, 6.9
9	Two-way ANOVA	DVD, Sections 6.1-6.7, 6.9
10	Spring Break	-
11	Higher order ANOVA	DVD, Sections 7.1-7.5
12	Midterm 2 Block designs	DVD, Chapter 10
13	ANCOVA	DVD, Section 7.6, Chapter 9
14	Random and mixed effects	DVD, Sections 17.1-17.5
15	Random and mixed effects	DVD, Sections 17.6-17.11, 19.1-19.3

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

Any grade adjustments will apply to the entire class. Calculated final grades that are within one percentage point of the next highest letter grade cut-off will be automatically rounded up to the next highest letter grade at the end of the semester.

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) rather than using the Carmen email tool. **Please write "STAT 6910" somewhere in the subject line**, as this will help me to quickly identify and reply to class emails promptly. Due to the large volume of emails, I will to reply to e-mails within **48 hours on school days**.

Attendance, participation, and discussions

Student participation requirements

Your participation is based on your in-person attendance. The following is a summary of everyone's expected participation:

- **In-person class meetings**: **REQUIRED**
  Attendance of the in-person lectures is required if possible. Please email the instructor for longer absences.

- **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**: **OPTIONAL OR FLEXIBLE**
  Attending in-person office hours is optional.

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.

- **Tone and civility**: Let's maintain a supportive learning community where everyone feels safe and where people can disagree amicably.
- **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.)

Other course policies

Health and safety

The Ohio State University Wexner Medical Center's Cornavirus 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 exams yourself, without any external help or communication.
- **Written assignments**: Your written assignments, 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 includes many opportunities for formal collaboration with your classmates. While study groups are allowed, remember that copying answers is not permitted. If you're unsure about a particular situation, please feel free just to ask ahead of time.

Policy on the use of Artificial Intelligence

The OSU Committee on Academic Misconduct has provided the following policy on the use of AI by students in academic courses: *To maintain a culture of integrity and respect, generative AI tools should not be used in the completion of course assignments unless an instructor for a given course specifically authorizes their use. Some instructors may approve of using generative AI tools in the academic setting for specific goals. However, these tools should be used only with the explicit and clear permission of each individual instructor, and then only in the ways allowed by the instructor.*

In accordance with this policy, in our course, students will not use AI to complete any assigned class work. If you are not sure if a tool you wish to use is permitted for our course or wish to use a tool for specific purpose you think does not violate the principles articulated here, please contact me to discuss it first.

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

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

Accessibility of course technology

This 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 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 reliable guide for the course content. However, you cannot claim any rights from it and 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.