



THE OHIO STATE UNIVERSITY

COLLEGE OF ARTS AND SCIENCES

SYLLABUS: STAT 6450

APPLIED REGRESSION ANALYSIS

SPRING 2025

Course overview

Instructor

Instructor: Isa Marques

Email address: marques.130@osu.edu

Lectures: EC (Enarson Classroom Building) 226, Wednesdays and Fridays, 3:00–5:00 pm

Office hours: Wednesdays 5:15-6:15 pm or by appointment (Cockins Halls 205B)

Grader or Teaching Assistant

Rezoanoor Rahman

Email address: rahman.282@buckeyemail.osu.edu

Office hours: Fri 11:30 am -12:25 pm (Zoom)

Role: Grading homework assignments and answering questions about homework

Office hours.

Course description

Statistics 6450 is intended to be an introduction to regression analysis techniques. We assume that students are familiar with organizing and summarizing data, the nature of relationships between variables, sampling distributions and the underlying rationale for hypothesis tests and confidence intervals. This course will focus on the application of linear regression models in practice but will also cover basic theory of the linear model. Core topics include simple linear regression, multiple linear regression, model diagnostics and model selection, regression analysis with categorical variables and generalized linear models.

Prerequisite or corequisite:

Statistics 6201 or equivalent. Knowledge of matrix algebra and computing skills will be helpful.

Course learning outcomes

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

- Understand the motivation of regression analysis
- Understand the theoretical assumptions behind the linear model and their importance in properly conducting a regression analysis
- Know how to estimate the parameters in regression models
- Be able to validate the modeling assumptions with formal tests and visual diagnostic tools
- Know how to make inferences regarding the linear model
- Be able to build and validate regression models in a principled manner
- Be able to apply the above knowledge and techniques in on your own data or problems

Course materials

Required

We will use the textbook *Applied Linear Regression, Fourth Edition* (2014) by Sanford Weisberg. An electronic version of the book can be accessed for free through The Ohio State University Libraries at <https://library.ohio-state.edu/record=b8665795~S7>. You will need to click on “Connect to resource EBSCOhost”; you may also 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.

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
- Recording a slide presentation with audio narration
- Recording, editing, and uploading video

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

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>.

Use of electronic devices

Recording of any kind -- including but not limited to video, audio, still photography, or screen recordings -- is strictly prohibited during class unless explicit prior approval has been obtained from the instructor.

Course delivery

The course will be **delivered in person** at the scheduled class times. Students are expected to attend lectures as well as studying the material that is assigned. Also, the instructor will hold weekly office hours and will post homework assignments on the course website. Please check the course website frequently for important announcements, lecture material, homework assignments and solutions.

Grading and faculty response

Grades

Assignment or category	Percentage
Homework	30
Midterm Exam	30
Final Exam	40
Total	100

Assignment information

Homework:

Homework will be assigned biweekly and will include both written problems and computer programming/data analysis tasks. Collaboration is encouraged, but each student must submit their own work, written in their own words.

Submission Requirements

- All homework must be submitted via the class website (Carmen).
- Ensure that each question is clearly labeled. Include all supporting work, such as computer code, and ensure figures and tables are properly referenced and interpreted in the text.
- Submissions must be legible and complete to receive full credit.

The following penalties will apply to late submissions based on the time elapsed after the deadline:

Delay	Penalty (% of total points obtained)
Up to 1 hour	-10%
Between 1 and 6 hours	-20%
Beyond 6 hours	-100%

If you anticipate needing an exception, you must contact the instructor at least one school day before the deadline. Exceptions may be granted only in cases of significant circumstances.

Exams:

There will be one midterm exam and one comprehensive final exam.

- Midterm exam: Wednesday February 26 during class time.
- Final Exam Date (University scheduled): Thursday April 24 4:00pm-5:45pm

If you cannot be available at these times for unavoidable reasons, you must speak with the course instructor immediately. If you fail to take an exam during the time when it is available without any communication with us to explain, we will not allow you to make up the exam unless there is an emergency that you can document.

Both exams will be closed-book/closed-notes; however, you will be allowed a calculator and double-sided A4 formula sheets. We take academic honesty very seriously in this course. You may communicate only with the instructor if you have any questions during the exam periods.

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.)

Preferred contact method:

- If you have questions about the lectures or notice any typos in the materials, please email the instructor. I will reply to e-mails within 24 hours on school days.
- If you have questions about the grading of homework assignments, please email the teaching assistant directly.

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:

- **Attend class meetings: TWO TIMES PER WEEK**
Students are expected to attend and participate in class meetings.
- **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**

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.

Other course policies

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 all midterm and final exams on your own without assistance from anyone other than the course instructor. You may not assist anyone on an exam.
- **Written assignments:** Your written assignments should be your own original work. In formal assignments, you should cite the ideas and words of your research sources.
- **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.
- **Collaboration and informal peer-review:** While study groups and peer-review of major written projects are permitted, remember that comparing answers on a quiz or assignment is not permitted. If you're unsure about a particular situation, please feel free to ask the instructor.

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 3335-5-48.7 (B)). For additional information, see the Code of Student Conduct <https://trustees.osu.edu/bylaws-and-rules/code>.

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. **No course materials provided by the instructor (notes, videos, recordings, computer code, homework assignments, homework solutions, quizzes, exams, etc.) may be distributed publicly or privately to anyone outside of the class.**

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

Diversity statement

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.

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

Religious Accommodations

Ohio State has had a longstanding practice of making reasonable academic accommodations for students' religious beliefs and practices in accordance with applicable law. In 2023, Ohio State updated its practice to align with new state legislation. Under this new provision, students must be in early communication with their instructors regarding any known accommodation requests for religious beliefs and practices, providing notice of specific dates for which they request alternative accommodations within 14 days after the first instructional day of the course. Instructors in turn shall not question the sincerity of a student's religious or spiritual belief system in reviewing such requests and shall keep requests for accommodations confidential.

With sufficient notice, instructors will provide students with reasonable alternative accommodations with regard to examinations and other academic requirements with respect to students' sincerely held religious beliefs and practices by allowing up to three absences each semester for the student to attend or participate in religious activities. Examples of religious accommodations can include, but are not limited to, rescheduling an exam, altering the time of a student's presentation, allowing make-up assignments to substitute for missed class work, or flexibility in due dates or research responsibilities. If concerns arise about a requested accommodation, instructors are to consult their tenure initiating unit head for assistance.

A student's request for time off shall be provided if the student's sincerely held religious belief or practice severely affects the student's ability to take an exam or meet an academic requirement and the student has notified their instructor, in writing during the first 14 days after the course begins, of the date of each absence. Although students are required to provide notice within the first 14 days after a course begins, instructors are strongly encouraged to

work with the student to provide a reasonable accommodation if a request is made outside the notice period. A student may not be penalized for an absence approved under this policy.

If students have questions or disputes related to academic accommodations, they should contact their course instructor, and then their department or college office. For questions or to report discrimination or harassment based on religion, individuals should contact the Office of Institutional Equity. (Policy: Religious Holidays, Holy Days and Observances, <https://oaa.osu.edu/religious-holidays-holy-days-and-observances>)

Accessibility accommodations for students with disabilities

The university strives to maintain a healthy and accessible environment to support student learning in and out of the classroom. 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.

If you are ill and need to miss class, including if you are staying home and away from others while experiencing symptoms of a viral infection or fever, please let me know immediately. In cases where illness interacts with an underlying medical condition, please consult with Student Life Disability Services to request reasonable accommodations. You can connect with them at slds@osu.edu; 614-292-3307; or slds.osu.edu.

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

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	Jan 8, 10	Introduction, background materials, data sources
2	Jan 15, 17	Simple Linear Regression (SLR) – parameter estimation and inference
3	Jan 22, 24	SLR – inference on model and ANOVA
4	Jan 29, 31	SLR - Visual diagnostics, lack of fit test, data analysis
5	Feb 5, 7	SLR- diagnostic tools, remedies, transformations, simultaneous inference, data analysis
6	Feb 12, 14	Recap of Linear Algebra, SLR in matrix form Multiple Linear Regression (MLR) –introduction and estimation, models with interactions
7	Feb 19, 21	MLR – inference, diagnostics and remedy, general linear test
8	Feb 26, 28	Midterm Exam , MLR – inference, diagnostics and remedy, general linear test
9	Mar 5, 7	MLR – inference, diagnostics and remedy, general linear test, extra sum of sums and multicollinearity
10	Mar 12, 14	Spring break
11	Mar 19, 21	MLR – polynomial regression, interaction regression
12	Mar 26, 28	MLR -- regression models with qualitative predictors
13	Apr 2, 4	MLR -- Model selection and validation
14	Apr 9, 11	MLR – model diagnostics

Week	Dates	Topics, Readings, Assignments, Deadlines
15	Apr 16, 18	MLR – model diagnostics Generalized Linear Models (if time permits)
16	Apr 24	Exam