



THE OHIO STATE UNIVERSITY

STAT 3301

Statistical Modeling for Discovery I (24810)

Autumn 2026

Syllabus - Instructor Information

Andrew Richards

Professional Qualifications

PhD, Statistics, The Ohio State University

MBA, Yale School of Management

BS, Physics, U.S. Naval Academy

Syllabus - Required or Recommended Readings

Required Text: *Applied Linear Regression*, Fourth Edition (2014) by Sanford Weisberg.

An electronic version of the text can be accessed for free through The Ohio State University Libraries at <https://library.ohio-state.edu/record=b7651844~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.

Syllabus - Course Schedule

Week -- Topic

- 1 -- Intro.
- 2 -- Correlation.
- 3 -- SLR model.
- 4 -- Inference and prediction with SLR.
- 5 -- Sums of squares.
- 6 -- Diagnostics and transformations.
- 7 -- MLR model.
- 8 -- Polynomial regression.
- 9 -- MLR inference.
- 10 -- Confidence and prediction intervals.
- 11 -- Categorical predictors.
- 12 -- Categorical and continuous predictors.
- 13 -- Multifactor models.
- 14 -- Model comparison.
- 15 -- Cross validation.
- 16 -- Stepwise and nonlinear regression.

Course Details - Instructor Contact Details

Email: richards.1227@osu.edu **not** buckeyemail

Course Details - Office Hours

Office: Cockins Hall 325

Time: MWF 1:15-2:15 and by appointment

Course Details - Additional Instructional Staff

Graders:

Alex Nguyen (.2119)

Sang Wan Lee (.10007)

Course Details - Class Meeting Details

Class Meeting Details: 11:30 AM-12:25 PM - Pomerene Hall 250 - MWF

Course Details - Course Description

Statistical models for data analysis in the linear regression framework. The challenges of developing meaningful models for data are explored, with emphasis on the model building process, the use of numerical and graphical diagnostics for assessing model fit, and interpretation and communication of results. Statistical foundations are introduced along with basic inferential techniques. Prereq: C- or above in 3202; or 4202 and 5732; or permission of instructor. Prereq or concur: Math 2568; or permission of instructor.

Prerequisite(s) / Corequisites: Prereq: C- or above in 3202; or 4202 and 5732; or permission of instructor. Prereq or concur: Math 2568; or permission of instructor.

Course Details - More About This Course

This course covers statistical models for data analysis in the linear regression framework. The challenges of developing meaningful models for data are explored, with emphasis on the model building process, the use of numerical and graphical diagnostics for assessing model fit, and interpretation and communication of results. Statistical foundations are introduced along with basic inferential techniques.

Course Details - Course Learning Outcomes

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

- Use graphical and numerical summaries of data to describe relationships between variables.
- Formulate, fit, evaluate, and compare regression models that describe relationships between variables.
- Understand and be able to describe the statistical foundations of standard regression models.
- Identify common violations of the assumptions that underly standard regression models.
- Perform a complete regression analysis and communicate the results in both statistical and problem-specific terms.
- Distinguish between descriptive and causal interpretations of regression.

Course Details - Course Supplies

Required software:

- This class requires you to use the free statistical software package called R (The R Project for Statistical Computing; <http://www.r-project.org/>).
 - 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/Rintro.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.
- This class requires the use of the (free) R Markdown authoring framework to complete assignments. Information about R Markdown will be provided in class; an online guide with overview information can be found at <https://rmarkdown.rstudio.com>.

Course Details - Canvas Assignment Schedule

Date	Name	Assignment Type	Points
9/4/26	<u>HW 1</u>	Assignment	20
9/14/26	<u>HW 2</u>	Assignment	20
9/23/26	<u>HW 3</u>	Assignment	20
9/25/26	<u>Midterm 1</u>	Assignment	100
10/2/26	<u>HW 4</u>	Assignment	20
10/9/26	<u>HW 5</u>	Assignment	20

Date	Name	Assignment Type	Points
10/19/26	HW 6	Assignment	20
10/26/26	HW 7	Assignment	20
10/28/26	Midterm 2	Assignment	100
11/6/26	HW 8	Assignment	20
11/16/26	HW 9	Assignment	20
11/30/26	HW 10	Assignment	20
12/2/26	Midterm 3	Assignment	100
12/9/26	Final Project	Assignment	30

Course Details - Grading Policy

Your final course grade will be based on the following weighting of assessment components:

Homework (20%)

Midterms (20% each)

Final Project (30%)

Less weakest category (-10%)

Total (100%)

Course Details - Grading Scale

Letter Grade	Percentage Range
A	100% to 93%
A-	< 93% to 90%
B+	< 90% to 87%
B	< 87% to 83%
B-	< 83% to 80%
C+	< 80% to 77%
C	< 77% to 73%
C-	< 73% to 70%
D+	< 70% to 67%
D	< 67% to 60%
E	< 60% to 0%

Course Details - Instructor Policies

Homework:

- **Description:** There will be ten homework assignments. Homework problems that require R software should be completed in R Markdown and a knitted html file should be uploaded. Homework problems that do not require R may be handwritten (electronically, or on paper and scanned) and uploaded to Carmen by the due date. All work and software output should be uploaded as a single pdf file unless stated otherwise.
- **Academic integrity and collaboration:** The purpose of the written homework is to assess and provide feedback on your understanding. 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. You may consult with other students, however, **the work submitted must be your own.**

Data analysis assignment:

- **Description:** There will be an comprehensive data analysis project that will be completed by the end of the semester. Expect details on the project to be posted in early November. Expect there to be a 5-7 page write up that may be completed in groups and an short individual oral defense (5-10 min) to be completed during finals week.
- **Academic integrity and collaboration:** The data analysis project should be completed **without any unauthorized help or communication.** Sharing of code or other unauthorized discussion between students is **strictly prohibited.**

Exams:

- **Description:** There will be three midterm exams. The midterms will be held during lecture on the dates listed in the schedule.
- **Academic integrity and collaboration:** You must complete the midterm and final exams yourself, **without any external help or communication.** Sharing of any items such as calculators or formula sheets is **prohibited.** Use any other internet-connected device (including calculators) during the exam is **prohibited.** Answers with little or no explanation or work shown **will not receive credit.** Students are **strongly advised** to prep a formula highlight sheet in advance.

Late assignments policy: Assignment solutions will be posted shortly after the submission deadline. No late assignments will be accepted without **prior permission** and/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. Deadlines are crucial in order, among other things, to:

- Get grading done and provide feedback in a timely manner
- Grade all assignments at the same time to maintain consistency and fairness
- Provide a mechanism to help ensure students keep up with the material and are prepared for follow-on lectures
- Protect students from their inability to predict their own future behavior – "I'll somehow manage to catch up at the end of the semester."

Course attendance policy: You are expected to attend all lectures. I will take attendance at lecture, and students are responsible for all material covered in class. I intend to simulcast lectures on zoom for students who are sick, but **I will not record lectures or provide annotated notes.** Students should keep all electronics closed during class with the exception of taking notes on a tablet. Students who persist in using cell phones or laptops in class **will be asked to leave.** Office hours should not be used for instruction on material that has already been covered in class.

Course technology: Students are expected to have a basic working knowledge of The Microsoft Office software. All Ohio State students are now eligible for free Microsoft Office 365. Visit the go.osu.edu/office365help help article for full instructions.

E-mail Correspondence: In order to protect your privacy, all course email correspondence must be done through a valid OSU name.# account. Please use the correct email address. (Richards.1227@osu.edu **not** @buckeyemail.osu.edu). Please write "STAT 4201" 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.

Copyright: 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.

Disclaimer: The planned instruction for this course may be disrupted for a

number of reasons. Such disruptions may affect individual students for a brief period of time, the entire class, the instructor, or the entire university. If the class is disrupted, we will adjust as needed. The adjustments may include changes to course delivery, assignments, grading of assignments, and determination of final course grade. Please pay special attention to announcements in class and over Carmen. **Failure to address every possible scenario in this syllabus does not override your responsibility to exercise basic common sense. If in doubt about any course policy, ask in advance!**

Syllabus - University Policies

Office of Undergraduate Education - Standard Syllabus Statements

- [Academic Misconduct](#)
- [Religious Accommodations](#)
- [Accommodations for Disability and Illness](#)
- [Intellectual Diversity](#)
- [Grievances and Solving Problems](#)
- [Creating an Environment Free from Harassment, Discrimination, and Sexual Misconduct](#)
- [Copyrights](#)
- [Content Warnings](#)
- [Mental Health Support](#)
- [Resources for Military-Connected Students](#)
- [Campus-wide Class Cancellations](#)