



# Syllabus

## STAT 5302 Intermediate Data Analysis II

Spring 2025

3 Credit Hours

### Course overview

#### Lectures

MWF 3:00pm-3:55pm in Enarson Classroom Building 015

#### Instructor

- Name: Yoonkyung Lee
- Office: Cockins Hall 440H
- Office Hours: M 4:10-5:05pm, R 2:00-2:55pm, or by appointment
- Email: lee.2272@osu.edu
- Phone: 292-9495

#### Grader

- Name: Jiwon Hong
- Office: Cockins Hall 305A
- Office Hours: by appointment only
- Email: hong.1069@osu.edu

#### Course webpage

The course has a web page on Carmen (<https://carmen.osu.edu/>). You will find the class schedule, course announcements, homework assignments, and other information about the class on the web page. Please check it out on a regular basis.



## Course description

STAT 5302 is the second course in a two-semester sequence in Intermediate Data Analysis (5301-5302). 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. We also assume that students are comfortable with a variety of models and inferential procedures. Specifically, the material in 5302 relies heavily on the additive model (see the early part of the text for a description of this model) and one-way ANOVA. The course will cover simple linear regression, multiple linear regression, and two-way (and multi-way) ANOVA. For each of the common statistical methods covered in the course, we will focus on generation of appropriate models for data, estimation of the model parameters and their inference, and model diagnostics. Applications of the methods will be illustrated with data analysis.

## Course expected learning outcomes

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

1. Identify an appropriate analysis for data collected in a study
2. Carry out such an analysis
3. Examine whether the assumptions behind the analysis are reasonable
4. Recognize the strengths or weaknesses of the study based on how the data was collected
5. Understand how the design of a study affects the conclusions that can be made
6. Write and discuss what conclusions can be drawn from statistical analyses

## General education goals and expected learning outcomes



This course satisfies the **General Education foundation requirement in Mathematical and Quantitative Reasoning or Data Analysis** which has the following goals and expected learning outcomes:

**Goals:** Successful students will be able to apply quantitative or logical reasoning and/or mathematical/ statistical methods to understand and solve problems and will be able to communicate their results.

**Expected Learning Outcomes (ELOs):** Successful students are able to:

1. Use logical, mathematical and/or statistical concepts and methods to represent real-world situations.
2. Use diverse logical, mathematical and/or statistical approaches, technologies and tools to communicate about data symbolically, visually, numerically and verbally.
3. Draw appropriate inferences from data based on quantitative analysis and/or logical reasoning.
4. Make and evaluate important assumptions in estimation, modeling, logical argumentation and/or data analysis.
5. Evaluate social and ethical implications in mathematical and quantitative reasoning.

This course also satisfies the **Legacy General Education requirement in Data Analysis** which has the following goals and expected learning outcomes:

**Goals:** Students develop skills in drawing conclusions and critically evaluating results based on data.

**Expected Learning Outcomes (ELOs):**

1. Students understand basic concepts of statistics and probability.
2. Students comprehend methods needed to analyze and critically evaluate statistical arguments.
3. Students recognize the importance of statistical ideas.



## Prerequisites

Stat 5301 (Intermediate Data Analysis I) or permission of the instructor

## Attendance policy

You are expected to attend all lectures.

## Textbooks

### Required

*The Statistical Sleuth: A Course in Methods of Data Analysis* by Ramsey F. and Schafer D. (2012), 3rd Edition, Cengage Learning, ISBN-13:978-1-133-49067-8.

The textbook for this course is being provided via CarmenBooks. Through CarmenBooks, students obtain publisher materials electronically through Carmen/Canvas. You can access this eBook through the **CarmenBooks** reader link in the course navigation of the Carmen course for this class. For more information on the program or information on how to opt out, please visit the [CarmenBooks website](#).

## Computing

You will be required to do some basic statistical analyses on the computer using the statistical software package R for your assignments. The RStudio IDE (integrated development environment) is an easy-to-use interface to R. RStudio requires R to be installed. Both R and RStudio are free, open-source software and can be downloaded from the following websites.

R: [www.r-project.org](http://www.r-project.org)

RStudio: [posit.co](http://posit.co)

Additional information on R will be provided on the course website.

## Grading

Your course grade will be assigned on the basis of performance on homework assignments, a midterm, and a comprehensive final exam.

### How your grade is calculated

Category	Percentage
Homework Assignments	30%
Midterm	30%
Final exam	40%
<b>Total</b>	<b>100%</b>

### Grading scale

While the standard grading scale generally applies, final grades may be curved upwards.

### Homework assignments

Homework will be assigned regularly (about every two weeks) throughout the semester using the Assignments link on Carmen. Homework should be uploaded to Carmen for grading. Homework solutions will be posted on the course website. While you can work with other students on homework, you should produce your own work to be submitted. Due dates for homework assignments will be announced on Carmen and in class.

### Late assignments



No late homework assignments will be accepted with few exceptions. If you have documented reasons for missing work or needing extra time, please contact me as soon as possible prior to the due dates. Where appropriate, due dates could be extended.

## **Exams**

There will be one midterm exam. The midterm will be in person, during class time. Information about the exam will be posted well in advance through the course website and also announced in class. The final exam will be cumulative but will emphasize the more recent material. It will be in person, during the scheduled final exam hours. There will be no make-up exams.

## **Academic policies**

### **Academic integrity policy**

Although students are encouraged to work together on assignments, each student is expected to write and submit individual solutions to homework problems. The midterm and final exam are to be completed on your own without any external help or communication. Academic misconduct will not be tolerated and will be dealt with procedurally in accordance with university 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: <http://studentlife.osu.edu/csc/>.

### **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.

## **Accessibility accommodations for students with disabilities**

### **Requesting accommodations**

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](mailto:slds@osu.edu); 614-292-3307; or [slds.osu.edu](http://slds.osu.edu).

### **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](#)





## Course schedule (tentative)

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

Week	Date	Topics/Readings	Assignments Due
1	1/6-1/10	Introduction, Simple linear regression model, Least squares regression estimation (7.1-7.3)	
2	1/13-1/17	Inference about slope and intercept, Estimate of the mean response (7.4)	
3	1/20-1/24	1/20 (M): Martin Luther King Jr. Day  Prediction of a future response (7.4), Interpretation after Log transformation (8.4)	1/24 (F): HW1
4	1/27-1/31	ANOVA for Regression, R-squared (8.6), Residual diagnostics (8.1-8.3), Simple LR vs one-way ANOVA, Lack-of-fit test (8.5-8.6)	
5	2/3-2/7	Lack-of-fit test (8.5), Multiple linear regression, Power transformation, Creating explanatory variables (9.1-9.4)	2/7 (F): HW2



Week	Date	Topics/Readings	Assignments Due
6	2/10-2/14	Interpretation of regression coefficients (9.5), Least squares method for multiple linear regression (10.1-10.2)	
7	2/17-2/21	Inference about regression coefficients and linear combinations of coefficients, Predictions (10.1-10.2)	2/21 (F): HW3
8	2/24-2/28	Testing a group of coefficients with F-test, Model comparison (10.3-10.4) 2/28 (F): Midterm	
9	3/3-3/7	Model checking with residual plots (11.1-11.2), Model refinement (11.5)	
10	3/10-3/14	Spring Break	
11	3/17-3/21	Weighted least squares (11.6), Influential observations, Case-influence statistics (11.3-11.4)	3/21 (F): HW4
12	3/24-3/28	Sequential methods for variable selection, All subsets regression (12.1-12.3)	



Week	Date	Topics/Readings	Assignments Due
13	3/31-4/4	Model selection criteria: Cp, AIC, BIC (12.3-12.4)	4/4 (F): HW5
14	4/7-4/11	Two-way ANOVA model, Additive and non-additive models (13.1-13.2)	
15	4/14-4/18	Two-way ANOVA table, Tests for a factor's effect, Test for interaction and interaction plots, Sequential sum of squares, Parametrizations of two-way ANOVA model (13.3-13.5)	4/18 (F): HW6
16	4/21-4/25	4/21 (M): Review 4/25 (F): Final exam (4:00pm-5:45pm)	

## 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.