The University of Iowa
The College of Liberal Arts and Sciences
Fall, 2024

STAT 4540:001 Statistical Learning
1:30 p.m. – 2:20 p.m. Mondays, Wednesdays, and Fridays in 140 SH

Title of Course:	STAT 4540:001 Statistical Learning
Course meeting time and place:	1:30 p.m. – 2:20 p.m. MWF in 140 SH
Department of Statistics and Actuarial Science:	`https://stat.uiowa.edu`
Course ICON site:	`https://uiowa.instructure.com/courses/191452`
Course Home:	`https://clas.uiowa.edu`

Instructor: Sanvesh Srivastava

Office location: 219 SH
Student drop-in hours: Mondays 3:30 p.m. to 4:30 p.m. and Fridays 2:30 p.m. to 4:30 p.m. Students are invited to drop by during these hours to discuss questions about the course material or concerns. I am also available by appointment if you are unable to attend my drop-in hours.
Phone: 319-335-0824
E-mail: `sanvesh-srivastava@uiowa.edu`
DEO: Kung-Sik Chan, 241 SH, and `kung-sik-chan@uiowa.edu`)

Course Description

The course is an introduction to supervised and unsupervised statistical learning, with a focus on regression, classification, and clustering. Methods will be applied to real data using appropriate software. Supervised learning topics include: linear and non-linear (e.g., logistic) regression; linear discriminant analysis; cross-validation, bootstrapping, model selection, and regularization methods (e.g., ridge and lasso); generalized additive and spline models; tree-based methods; and support-vector machines. Unsupervised learning topics include: principal components and clustering.

Learning Objectives

The students will develop an understanding of various statistical learning methods and will learn the computational skills to apply these methods to real-world data sets, to pursue a career in applied statistics, and to pursue research in statistical sciences and other data sciences.

It is expected that students will read the book, work on problems as required to master the material, and spend time applying the statistical learning methods to real-world data sets. You are expected

to put in 6-8 hours of work outside of class. A few of you will do well with less time than this, and a few of you will need more.

Textbook and course materials

The required textbook for this course is:

- Title: *An Introduction to Statistical Learning, with applications in R*
- Authors: *G. James, D. Witten, T. Hastie, and R. Tibshirani*
- Publisher: *Springer*
- Edition: *Second*

The website accompanying the book is `https://www.statlearning.com/`. This website is an excellent resource for many materials that we will use throughout this course, including a pdf copy of the book.

The instructor will post announcements, homework problems, lecture notes, and other course information in Canvas.

Pre-requisites

An introductory statistics course and a regression course. Prior exposure to programming and/or software, such as R or Python is recommended.

Attendance

Attending classes is required, but the instructor won't take attendance.

Office hours

The instructor *is available for in-person office hours* every Monday from 3:30 p.m. to 4:30 p.m. and every Friday from 2:30 p.m. to 4:30 p.m. in SH 219.

The instructor *is available for office hours via Zoom*. A student is required to email the instructor about scheduling the meetings and give the instructor sufficient time to respond. *A student can also schedule the meeting before or after the lecture but not during the lecture*. If you are unable during these times, then you should email the instructor for an appointment and suggest a set of time slots that suit you. *You should email early enough so that the instructor has enough time to schedule a meeting.*

The *zoom link* for all the *personal meetings for office hours* is `https://uiowa.zoom.us/j/4107308187`.

Grading System

Your grade will consist of homeworks (30%), two midterms (10% each, 20% total), a project (20%) and a final exam (30%). At the end of the semester, homework, midterm, project, and final grades are normalized within each category in order to calculate the final course grade.

A plus-minus grading system will be used. Here is a *tentative grading scale:* A,A-: 88%–100%, B+,B,B-: 70%–88%, C+,C,C-: 60%–70%, D: 50%–60%, F:<50%. A+ will be given only in exceptional cases. The instructor reserves the right to change the grade distribution by 10% so that it suits the diversity of students in the class.

Homework

Homework will be usually assigned every other week on Fridays and will be due two weeks later on Friday. Homework submission will be online. Any exceptions will be announced in class or in Canvas. Your work must be legible and include your name at the top to receive credit. Due to time constraints, the grader may grade only some of the assigned questions, but you are responsible for understanding all questions.

All homeworks will contribute towards your final grade. Unless prior arrangements are made well in advance, for reasons judged to be acceptable by the instructor, late homework will receive zero credit as solutions will be posted soon after the homework is due.

Exams

There are **no** quizzes in this class. There are two midterm and one final exams. The midterm and final exams will emphasize examples and key concepts repeatedly mentioned in class and in homework problems. All exams will be closed book. The final exam will be comprehensive and cumulative, but the emphasis will be on the material covered after the second midterm. You will be allowed *one* A4-sized handwritten "cheat-sheet" for every exam. You can use cheat-sheet from the previous exams (i.e., *one* for the first midterm, *two* for the second midterm, and *three* for the final exam in total).

Project

The project will be due after the fall break. It consists of a series of questions for analyzing a real-life data set and the students will answer these questions based on the methods and tools learned in the class. A project report summarizing the answers to the questions and related findings will be submitted online. More details will be announced on Canvas as the course progresses.

Lab

Labs will be held depending on the needs of the students and will be announced in class or in Canvas.

Extra help

Several graduate students have volunteered to independently tutor students in various courses at mutually-arranged times and fees. Please check the web site `https://tutor.uiowa.edu/statistics-tutorial-lab` for tutoring details.

Grading Errors

Although every effort will be made to mark your work accurately, sometimes grading mistakes happen. If you believe that an error has been made on an in-class problem or exam, then please email the instructor immediately stating your claim in writing.

Important Dates

Check the office of the registrar website for the academic calendar:
`http://registrar.uiowa.edu/academic-calendar#!fall-2024`

Some important **tentative** dates for STAT 4540 are as follows:

Midterm I:	Tuesday, Oct 01
Midterm II:	Tuesday, Nov 05
Final Exam:	Mon, Dec 16 – Fri, Dec 20 (to be decided by the university)

Tentative Schedule

Chapters	Week	HW (Assigned)	Deadlines
1-2	08/26 – 08/30	1	
2-3	09/02 – 09/06		HW 1
3	09/09 – 09/13	2	
3-4	09/16 – 09/20		
4	09/23 – 09/27	3	HW 2
4-5	09/30 – 10/04		Midterm 1 (Chapters 1–3)
5-6	10/07 – 10/11	4	HW 3
6	10/04 – 10/18		
6	10/21 – 10/25		HW 4
6-7	10/28 – 11/01	5	Midterm 2 (Chapters 4–6)
7	11/04 – 11/08	Project	
12	11/11 – 11/15		HW 5
12	11/18 – 11/22	6	
Break	11/25 – 11/29		–
9	12/02 – 12/06		Project Due
11	12/09 – 12/13		HW 6
	12/16 – 12/20		Final Exam

UI and the College of Liberal Arts and Sciences
Information for Undergraduate/Graduate Students

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the CLAS Code of Academic Honesty.

Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor, and finally with the Director or Chair of the school, department, or program offering the course.
Undergraduate students should contact CLAS Undergraduate Programs for support when the matter is not resolved at the previous level. Graduate students should contact the CLAS Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course

You may drop an individual course before the deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course here. When you drop a course, a "W" will appear on your transcript. The mark of "W" is a neutral mark that does not affect your GPA. Directions for adding or dropping a course and other registration changes can be found on the Registrar's website. Undergraduate students can find policies on dropping and withdrawing here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

University Policies

Accommodations for Students with Disabilities
Basic Needs and Support for Students
Classroom Expectations
Exam Make-up Owing to Absence
Free Speech and Expression
Mental Health
Military Service Obligations
Non-discrimination
Religious Holy Days
Sexual Harassment/Misconduct and Supportive Measures
Sharing of Class Recordings