# Syllabus - Stats

## STATS 8 syllabus - fall 2023

**objectives - topics - organization - grading - integrity - requirements - wellbeing**

*This course has a **hybrid format,** with some asynchronous video material plus one weekly in-person discussion (Wed) and one weekly in-person lecture (Thu* usually). Occasional accommodations are described below. The **final exam (https://canvas.eee.uci.edu/courses/57138/pages/exams)** will be conducted on campus **in-person** (**Dec 12, 8-10am (https://www.reg.uci.edu/perl/WebSoc)**); a laptop or tablet capable of using CrunchIt for data analysis will be needed.*

## Class objectives

### Objectives

My objective is to provide both an understanding of, and hands-on experience with basic, data-centric statistics. This class is similar to a regular statistics class except that we focus the application of statistics on examples of actual studies from a wide array of biological interests: from biomedical studies and pharmacology, to ecology, genetics, physiology and related socio-economic questions.

By the end of this course, you should be able to analyze and present data, design observational and experimental studies, use probabilities to model and predict random events, and use inference procedures to test hypotheses and estimate population parameters to reach conclusions in context. What you learn in this class should help you understand broadly the methodology, results, and issues of studies presented in your other classes or in news stories. I also hope that you will come to appreciate statistics as a cool and really interesting subject.

### GE requirement (Va: Quantitative Literacy)

Note that STATS 8 satisfies the **General Education requirement for Category Va, Quantitative Literacy**, with the following learning outcome objectives: Students should be able to
1) Identify appropriate tools for quantitative analysis of processes or events.
2) Have a basic familiarity with fundamental principles underlying quantitative descriptions of natural or social processes.
3) Be able to do one or more of the following: evaluate studies and reports that assess risk and probability in everyday life; use models of natural phenomena to make quantitative predictions of future behavior or events; use models of economic and social structures to make quantitative predictions of future behavior or events.

## Topics covered

1. Data collection: random samples, observational designs, experimental designs, confounding
2. Descriptive statistics: data organization, graphs, numerical summaries, interpretation in context
3. Association: correlation, regression, two-way tables, association versus causation
4. Probability concepts: fundamental rules, conditional probabilities, independence
5. Probability distributions: continuous distributions, Normal distributions and computations, sampling distributions
6. Confidence interval for a population mean: one sample and matched-pairs *t* intervals
7. Hypothesis test for a population mean: one sample and matched-pairs *t* tests
8. Inference for several means: two-sample *t* interval, two-sample *t* test, analysis of variance (one-way ANOVA)
9. Inference for categorical data: one-sample *z* confidence interval for a proportion, chi-square test for two-way tables (+intro to chi-square for goodness of fit) and, time permitting, two-sample *z* interval for proportions

## Class organization

This course has a hybrid format with a pedagogical approach based on scientific studies of learning. It emphasizes retrieval, spaced out-practice, group work, and active engagement. The course also follows the Guidelines for Assessment and Instruction in Statistics Education (**GAISE** (https://www.amstat.org/education/guidelines-for-assessment-and-instruction-in-statistics-education-(gaise)-reports) ) endorsed by the American Statistical Association, which emphasizes statistics as an investigative process leading to comprehensive and nuanced interpretations in context.

**Each topic is covered with a consistent weekly format:**

**1. Self-paced learning:** The course's hybrid format starts with every student learning asynchronously from a set of short interactive videos hosted on Canvas. The interactive aspect of these videos is really important because humans do not learn well just by watching or reading notes (see "**How to study for this class** (https://canvas.eee.uci.edu/courses/57138/pages/how-to-study-for-this-class) "). A graded video-lesson quiz on Canvas is designed to help you assimilate and retain this knowledge.

▶ **Video lesson and quiz study tips** *(click the arrow)*

**2. Coached training:** You need opportunities to practice your new analytical skills with expert guidance. The class offers in-person training with your TA (Wed discussion) and with Dr. Baldi

(Thu* lecture). Because live participation is vastly preferable for learning, work done during lecture and discussion is also accrues participation points.

▶ **Lecture and discussion study tips**

**3. Self-paced practice:** Each topic has a homework assignment on **Achieve** (https://canvas.eee.uci.edu/courses/57138/external_tools/1688) to help you solidify your skills with practice. This is also a good time to (1) complement your learning with the textbook explanations and examples, and (2) seek help during the instructor's or the TAs' **office hours** (https://canvas.eee.uci.edu/courses/57138/pages/contact-info-and-office-hours) or asynchronously by posting/answering questions on our dedicated **Ed Discussion forum** (https://canvas.eee.uci.edu/courses/57138/external_tools/7799?display=borderless) .

▶ **Homework study tips**

***Infographic of weekly topic organization***
(https://canvas.eee.uci.edu/courses/57138/files/23728946?wrap=1) ⬇
(https://canvas.eee.uci.edu/courses/57138/files/23728946/download?download_frd=1)

# Grading

## Letter grades

Your letter grade in this class scales up with the number of **credits** accumulated, with a maximum of 21 credits available. As shown below, each additional credit earned above 10 increases your letter grade by one increment (for example, from B- to B, or from B+ to A-), but accumulating fewer than 10 credits for the whole quarter results in a letter F grade. This approach lets you know where you stand during the quarter and what you need to accomplish to earn a particular letter grade.

| Credits earned | 0--9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Letter grade | F | D- | D | D+ | C- | C | C+ | B- | B | B+ | A- | A | A+ |

## Elements contributing toward your overall letter grade

**LEARNING ACTIVITIES** (*based on satisfactory completion*):

**Video quizzes** (Canvas): contributing **4** credits toward your letter grade
**Lecture participation** (iClicker app): contributing **3** credits
**Discussion participation** (group work): contributing **3** credits
**Homework assignments** (Achieve): contributing **4** credits

**ASSESSMENTS** (*based on performance*):

**Progress assessment** (Gradescope): contributing **3** credits
**Final exam** (in-person): contributing **4** credits

### Requirements for earning the corresponding credits

- ▶ **Video quiz score and accommodations** *(click the arrow)*
- ▶ **Lecture participation score and accommodations**
- ▶ **Discussion participation score and accommodations**
- ▶ **Homework score and accommodations**
- ▶ **Progress assessment modality and scoring**
- ▶ **Final exam modality and scoring**

### Additional considerations

- ▶ Late adds
- ▶ Exam times
- ▶ Grade issues
- ▶ Workload
- ▶ Grading with credits
- ▶ Unexpected circumstances impacting the class

**For complex, long-term issues (such as regular military training, hospitalization or recurring medical treatment, extreme family issues), contact Dr. Baldi on Ed Discussion (https://canvas.eee.uci.edu/courses/57138/external_tools/7799?display=borderless) so that we can make appropriate alternate arrangements that work for your specific situation.** (An emergency email may be send, but a follow-up post on Ed is still needed to keep track of the issue and resolution).

## ***** Academic Integrity *****

The UCI policy on academic integrity can be found at **aisc.uci.edu (https://aisc.uci.edu/)** .

**Grades are an assessment of a student's accomplished learning. Therefore, ALL student work in this class must be the work of the individual receiving credit.** Academic dishonesty includes having someone else do graded work for you (an entire assignment or parts of it) or any activity in which you represent someone else's work as your own (such as a tutoring site, a third-party forum, or an AI chatbot). It also includes you doing this for someone else. *Note that study groups and group work for group submissions do not fall under the category of academic dishonesty, and provide instead an excellent learning opportunity.*

Acts of academic dishonesty will be officially reported to AICS for possible academic sanctions AND will result in an F in the course without option to drop.

Learning, research, and scholarship depend upon an environment of academic integrity and honesty. This environment can be maintained only when all participants recognize the importance of upholding fundamental ethical standards. We live in the world we collectively create, and we need to recognize the impact our actions have beyond ourselves.

***NOTE: All materials provided by your instructor are the sole copyright property of that instructor. This content is protected by copyright law and may not be shared, uploaded, or distributed (including on tutoring sites and AI chatbots) without express written consent from the instructor. Passing any original course material as your "own notes" is an act of plagiarism and intellectual property theft.***

# Course requirements

## Achieve: an online textbook and homework system

We use an online textbook-homework system called "Achieve for The Practice of Statistics in the Life Sciences, 4th edition" (PSLS4e) that contains the e-textbook, statistical software, graded assignments, and many useful resources. ***Detailed information about Achieve here (https://canvas.eee.uci.edu/courses/57138/pages/achieve-info)*** .

## Software

For the statistical computations needed in this class, you may use any software of your choice. We routinely use the free, web-browser-based statistical software **CrunchIt (https://crunchit3.bfwpub.com/psls4e)** (no installation needed). It is also needed for analytical work on the progress assessments and the final.

You need to use the **iClicker online app (https://canvas.eee.uci.edu/courses/57138/pages/achieve-info)** for graded participation during lecture. Use of this app for our class is free with purchase of Achieve.

## Equipment

You need a computing device (such as a desktop, laptop, or tablet) and stable internet access to watch the course videos and complete online assignments. Check out the UCI TechPrep website (**https://techprep.oit.uci.edu/learning/ (https://techprep.oit.uci.edu/learning/)** ) for help figuring out your technology setup.**You need to bring a laptop or tablet capable of using the internet and running CrunchIt for the final exam.**

## COVID accommodations

We abide by all **campus policies in response to the COVID-19 pandemic (https://uci.edu/coronavirus/)** . Students requiring **reasonable accommodations related to the**

coronavirus (https://sites.uci.edu/learnanywhere/f21-guidelines/) should reach out to the UCI Disability Services Center (949-824-7974 or dsc@uci.edu).

# Wellbeing

We should always take care of our physical and mental wellbeing first and foremost, and be kind to others.

## Class (n)etiquette

**In all interactions, in-person or online, we expect a positive attitude and respectful behavior.** Be kind, understanding, and helpful with everyone. Thank you :-)

## UCI resources

- UCI Disability Services Center (DSC): dsc.uci.edu (https://dsc.uci.edu/) (request accommodations early, because of processing times)
- UCI Learn Anywhere UCI Be Well portal: bewell.uci.edu (https://bewell.uci.edu/)
- UCI Basic Needs: basicneeds.uci.edu (https://basicneeds.uci.edu/) (Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the FRESH Basic Needs Hub at fresh@uci.edu (mailto:fresh@uci.edu) )
- UCI Division of Undergraduate Education (DUE): due.uci.edu (https://due.uci.edu/)
- UCI Office of Inclusive Excellence resources (https://inclusion.uci.edu/responsive-research/resources/ally-awareness-resources/)

## General wellbeing

- 988 Suicide & Crisis Lifeline: 988lifeline.org (https://988lifeline.org/) (or dial 988)
- How to Apply to Supplemental Nutrition Assistance Program (SNAP): Youtube video (https://www.youtube.com/watch?v=e0X2oeP9PIA)
- *Habits of a Happy Brain: Retrain Your Brain to Boost Your Serotonin, Dopamine, Oxytocin, & Endorphin Levels*, by Loretta Graziano Breuning
- Do you remember Zoom Fatigue? This Youtube video from PBS (https://www.youtube.com/watch?v=fpMWtlYGLxc) (very relatable) is a great motivation for getting to the classroom!