

Syllabus - Stats

STATS 8 syllabus - fall 2022

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*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). Occasional accommodations are described below. The **final exam** (<https://canvas.eee.uci.edu/courses/48402/pages/exams>) will be conducted on campus **in-person** (Tue 12/06, 4-6p). 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

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) [↗] ([https://www.amstat.org/education/guidelines-for-assessment-and-instruction-in-statistics-education-\(gaise\)-reports](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.

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 from watching (or just reading notes, for that matter; see "[How to study for this class](https://canvas.eee.uci.edu/courses/48402/pages/how-to-study-for-this-class)" (<https://canvas.eee.uci.edu/courses/48402/pages/how-to-study-for-this-class>)). A graded **video-lesson quiz** on Canvas is designed to help you assimilate and retain this knowledge.

- ▶ **Study tips** (*click the arrow*)
- ▶ **Issues with your video quiz?**

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 discussion and lecture will be used for participation points.

- ▶ **Study tips**
- ▶ **Discussion participation score and accommodations**
- ▶ **Lecture participation score and accommodations**

3. Self-paced practice: Each topic has a homework assignment on Achieve 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 on Zoom \(https://canvas.eee.uci.edu/courses/48402/pages/contact-info-and-office-hours\)](https://canvas.eee.uci.edu/courses/48402/pages/contact-info-and-office-hours) or asynchronously by posting/answering questions on our dedicated Ed Discussion forum (link in left margin).

- ▶ **Study tips**
- ▶ **Issues with the homework?**

[Infographic of weekly topic organization](https://canvas.eee.uci.edu/courses/48402/files/19832166?wrap=1)

[\(https://canvas.eee.uci.edu/courses/48402/files/19832166?wrap=1\)](https://canvas.eee.uci.edu/courses/48402/files/19832166?wrap=1) 

[\(https://canvas.eee.uci.edu/courses/48402/files/19832166/download?download_frd=1\)](https://canvas.eee.uci.edu/courses/48402/files/19832166/download?download_frd=1)

Grading

Grades

Your overall grade in this class will be determined from the following mix of grades:

LEARNING ACTIVITIES

- ▶ **10% video quizzes (Canvas)** -- *click the arrow for details*
- ▶ **10% discussion participation (group work)**
- ▶ **10% lecture participation (iClicker app)**
- ▶ **20% homework assignments (Achieve)**

PROGRESS ASSESSMENTS

- ▶ **10% progress assessment 1 (Gradescope, online)**
- ▶ **10% progress assessment 2 (Gradescope, online)**

PROFICIENCY TEST

- ▶ **30% final exam (Gradescope, IN-PERSON)**

Getting a good grade requires sustained work throughout the quarter and is entirely your responsibility. **This class is not curved:** if everyone works hard and seeks the help they need, everyone should be able to get a good grade. Understand that, based on the extent of their

familiarity with the subject, some students need to work harder than others; that is perfectly normal. What matters is that everybody can learn.

► Additional considerations

For complex, long-term issues (such as regular military training or hospitalization), contact Dr. Baldi on Ed or via email to make appropriate alternate arrangements one-on-one on Zoom.

***** Academic Integrity *****

The UCI policy on academic integrity can be found at aisc.uci.edu [\(https://aisc.uci.edu/\)](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. It also includes you doing this for someone else. *Study groups and group work for group submissions do not fall under the category of academic dishonesty and provide instead an excellent learning opportunity.*

All 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 the highest 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 and may not be shared, uploaded, or distributed (including on tutoring sites) 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 \(https://canvas.eee.uci.edu/courses/48402/pages/achieve-info\)](https://canvas.eee.uci.edu/courses/48402/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) (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 \(https://canvas.eee.uci.edu/courses/48402/pages/achieve-info\)](https://canvas.eee.uci.edu/courses/48402/pages/achieve-info) for graded participation during lecture. Use of this app for our class is free with purchase of Achieve.

Equipment

You will 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/>) 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 exams.**

COVID accommodations

We abide by all [campus policies in response to the COVID-19 pandemic \(https://uci.edu/coronavirus/\)](https://uci.edu/coronavirus/). Students requiring [reasonable accommodations related to the coronavirus \(https://sites.uci.edu/learnanywhere/f21-guidelines/\)](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 \(https://dsc.uci.edu/\)](https://dsc.uci.edu/) (request accommodations early, because of processing times)
- UCI Learn Anywhere UCI Be Well portal: [bewell.uci.edu \(https://bewell.uci.edu/\)](https://bewell.uci.edu/)

- UCI Basic Needs: basicneeds.uci.edu ↗ [\(https://basicneeds.uci.edu/\)](https://basicneeds.uci.edu/)
- UCI Division of Undergraduate Education (DUE): due.uci.edu ↗ [\(https://due.uci.edu/\)](https://due.uci.edu/)
- UCI Office of Inclusive Excellence [resources](https://inclusion.uci.edu/responsive-research/resources/ally-awareness-resources/) ↗ [\(https://inclusion.uci.edu/responsive-research/resources/ally-awareness-resources/\)](https://inclusion.uci.edu/responsive-research/resources/ally-awareness-resources/)

General wellbeing

- 988 Suicide & Crisis Lifeline: 988lifeline.org ↗ [\(https://988lifeline.org/\)](https://988lifeline.org/) (or dial 988)
- How to Apply to Supplemental Nutrition Assistance Program (SNAP): [Youtube video](https://www.youtube.com/watch?v=e0X2oeP9PIA) ↗ [\(https://www.youtube.com/watch?v=e0X2oeP9PIA\)](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=fpMWtIYGLxc) ↗ [\(https://www.youtube.com/watch?v=fpMWtIYGLxc\)](https://www.youtube.com/watch?v=fpMWtIYGLxc) (very relatable) is a great motivation for getting to the classroom!