Winter, 2025

Stat 301 – Statistics I

Instructor: Beth Chance
Class Time: Section 1: 9:10-10:00, MW Room 38-122; TR Room 22-315
Section 2: 10:10-11:00, MW Room 38-122; TR Room 22-315
Office Hours: T 2:30-3:30, W 11-12pm, 2-3pm, R 2:30-3:30, or by appointment, including Calendly, or any time my door is open
Office: Faculty Office Building East 25-235
Email: bchance@calpoly.edu (a very good way to reach me)
Course Listserv: stat-301-01-2252@calpoly.edu, stat-301-01-2252@calpoly.edu
Course Webpages: Canvas (http://my.calpoly.edu)
http://www.rossmanchance.com/iscam4/

Co-requisite: Math 141

Course Objectives: To gain an understanding of statistical principles and their uses. This course addresses issues in data collection, including sampling and experimental designs, graphical and numerical techniques for exploring and modeling data, and statistical inference. You will learn how to make inferences from samples to populations and between treatment groups in an experiment.

Texts/Materials:
Required: *Investigating Statistical Concepts, Applications, and Methods* (ISCAM)
Chance and Rossman, fourth edition – JMP/R version
You need either the printed pages or annotatable pdf file every day.
You are also encouraged to bring a scientific calculator with you to every class session. You should bring a laptop with you on Tuesdays/Thursdays.

We will be making heavy use of the investigations in the first four chapters of the book. I encourage you to take notes directly in the book and to supplement as we go along. We will also make use of several communication tools in Canvas (e.g., discussion boards), but I also expect you to check your Cal Poly email regularly. You will also need access to a browser (for applets) and to use either *R* or *JMP*.

Statistical Package/Calculators: We will primarily be using the *JMP* and/or R software packages for data analysis and exploration. You will be given instructions for how to use Excel, Word, JMP, R, and applets as needed for this course. You will need access to these packages outside of class as well.

Grading:

Investigations	10%
Labs	15%
Homework	20%
Participation	10%
Exams	10%, 15%
Final exam	20%

I anticipate that we will have cutoffs like 70/72/78/80/82/88/90/92/ for C-/C/C+/B-/B/B+ etc.

Coursework:

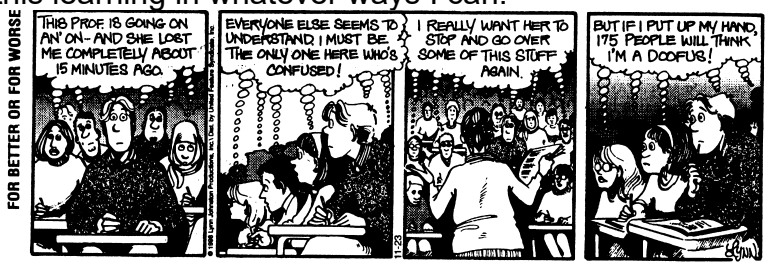
- *Investigations* On Tuesdays, you will work with a partner to complete the assigned investigation/questions. Your final submission will be due on Thursday (with a chance to ask questions on Wednesday, but may require some coordination outside of class).
- *Lab assignments* On Thursdays, you will work with a partner to complete the assignment. Your final submission will be due on the following Tuesday (with a chance to ask questions on Monday, but may require some coordination outside of class).
- *Homework problems* will be assigned roughly once per week. You will generally have one week to complete the assignments. The intention is for you to work on this assignment throughout the week (roughly 4 hours/week). You are encouraged to work with other people in the class and to submit questions to the course alias/discussion board, **but the work you turn in must be written up individually**. If you wait until the evening before, you will not have enough time to complete the assignment. Remember to always include relevant computer output. If I determine write-ups are too similar, the score will be divided among the matching papers. You are allowed to consult an AI program *for programming help only*, **the interpretations you submit must be your own**. The HW assignments will be due Friday night but you can submit by Saturday evening without penalty; solutions will be posted Sunday. Your lowest score will be automatically dropped at end.
- *Participation*: Your participation score will be comprised of several components including various surveys and forms, submitting I wonder questions, participation in classroom discussion, visits to office hours, and an Extensions assignment. On HW assignments I will suggest possible Extensions assignments (e.g., reviews of uses of statistics from outside the course, reviewing statistical talks on campus, comparing a news summary to the original research article) but you may find your own. You can submit **two** of these or you can work with 1-2 partners on **one** mini-data collection project (including a brief report of your findings). All extensions assignments must be submitted in Canvas by **March 13.**
  - Potential projects: You should evaluate some claim, ideally as a randomized experiment. For example: yawning is contagious. You could then implement yawn seeds and see whether the target subject subsequently yawns. If you plan to go this route, you/your group should submit a proposal by **Feb. 17** for feedback.
- *Exams* There will be two in class exams and one comprehensive final. Graded exams will be returned in class or can be picked up from the instructor. Tentative exam dates: Jan 30, Feb. 27

Advice: Some advice specific to this course from past students:

1. **Come to class!** In these sessions I hope to highlight key concepts, discuss common misconceptions, and directly answer individual questions.
2. **Participate in class.** Coming to class only contributes to your learning if you are willing to participate actively. During many class periods you will be asked to work on activities designed to help you learn the material and to explore the concepts and methods of probability and statistics. Please engage yourself fully with these activities.
3. **Work together.** Many of the in-class activities will ask you to work collaboratively with your peers. Please do so freely, as I believe that you will be able to help each other with your learning. I also encourage you to work and study together outside of class.
4. **Ask questions**. You will be coming into this course with very different backgrounds. I cannot always anticipate what explanation will be most efficient *for you*. Let me know what doesn't make sense so I can try a different one tailored to where you are.

5. **Review your notes often.** My intention is to enable you to put together a very extensive and useful set of class notes. I urge you to keep thorough notes and to review them often, particularly before starting homework assignments and while studying for exams.
6. **Check the course webpage and email list regularly.** Many students often have similar questions and additional insights that you can learn from. This is a good place to check for late breaking news and late-night inspirations.
7. **Start the assignments early.** You will usually be given at least one week to complete each assignment. Please avoid the temptation to put the assignments off until the last day; you should start early enough to be able to ask questions when they arise. It is also helpful to have the homework problems in mind when we cover the relevant material in class. Keep in mind that the material in this course builds cumulatively over the quarter.
8. **Take the course seriously.** This course should not be approached casually. One aspect of the course is that you will have to do a fair bit of writing, explaining, and presenting your results. It is important to practice the terminology and concepts frequently. I will be fairly demanding of your work under the belief this will improve your overall understanding and end-of-course performance.
9. **Have fun with the material.** This may seem to contradict the previous point, but I do think that statistics is a very fun, entertaining subject. We will be analyzing genuine data from a variety of real-world applications and diverse disciplines. Allow yourself to enjoy these aspects of the course, and feel free to suggest other applications that appeal to you.
10. **Think!** Do not treat the course as an exercise in mere "plug-and-chug" number-crunching, and do not try to apply formulas by rote to solve problems. (That's not what Statistics is about!) Think about what you are doing, recognizing that there are often several ways to solve a problem and that one clever thought might eliminate the need for pages of painful calculations. Use your intuitive sense to check your results.

Above all, **you are responsible for your own learning.** As your instructor, my role is providing you with contexts and opportunities to facilitate the learning process. Please call on me to help you with this learning in whatever ways I can.



Academic Integrity

The University Code of Academic Integrity is central to the ideals that undergird this course. Students are expected to be independently familiar with the Code and to recognize that their work in the course is to be their own original work that truthfully represents the time and effort applied. Violations of the Code are most serious and will be handled in a manner that fully represents the extent of the Code and that befits the seriousness of its violation. You and your student peers must have a strong commitment to personal and professional integrity that informs your behavior both before and after graduation, discouraging you from creating a false appearance of achievement by presenting the work of others as your own, or bending or breaking the rules of any situation. This includes the unauthorized use and sharing of information/course resources on the internet.

COVID-19 Compliance, Classroom, and Campus Safety
Cal Poly is committed to protecting the health and safety of the campus community. Taking preventative steps, as well as monitoring your health and staying home if you are feeling unwell, will help protect the entire Cal Poly community. By participating in this course, you agree to abide by all campus safety protocols. Please note that safety protocols may change throughout the quarter. You may wish to bring in your own device for computer work.

Support
If you face emotional or economic challenges this quarter, you are not alone, and Cal Poly can help during this time of crisis. For example:

- Cal Poly's Basic Needs initiative: basicneeds.calpoly.edu
- Student Care Resources: https://coronavirus.calpoly.edu/student-care-resources
- Cal Poly Coronavirus website: http://coronavirus.calpoly.edu/
- Disability Resource Center: drc@calpoly.edu
- Cal Poly's Counseling Services (805-756-2511)

If I can help you in any way to access the resources above, or if you have any questions about student care resources, please let me know, including textbook access.

Responsibilities
Through classroom discussion and online communication, I welcome individuals of all ages, backgrounds, beliefs, races, ethnicities, social classes, genders, gender identities, gender expressions, national origins, documentation statuses, religious affiliations, sexual orientations, abilities – and other visible and nonvisible differences. All members of this class are expected to contribute to a respectful and inclusive environment for every other member of the class. This does not mean we cannot disagree or have different ideas. It does mean we try to consider perspectives other than our own, though they may differ from our own beliefs/ experiences. If you experience disrespect or discrimination in this class, please report your experiences to me or the Statistics Department chair (aschaffn@calpoly.edu).

Tentative Schedule

	Day	Date	Inv	Topic	HW Due
1	M	1/6	Inv A	Data distributions	Initial course survey
2	T	1/7	Inv B	Probability model (Inv 1)	See HW 1 page
Chapter 1: Analyzing Statistical Processes					
3	W	1/8	1.1	Statistical significance	
4	R	1/9	1.2	Binomial test (Lab 1)	R: Inv 1, F: HW 1
5	M	1/13	1.3	Standardizing	
6	T	1/14	1.4	Strength of evidence (Inv 2)	Lab 1
7	W	1/15	1.5	Two-sided p-values, Confidence	
8	R	1/26	1.6	Confidence (Lab 2)	R: Inv 2, F: HW 2
9		1/20	1.8	No class meeting Normal distribution	
10	"M"	1/21	1.9	z-procedures (Inv 3)	Lab 2
11	W	1/22	1.10	Confidence intervals	
12	R	1/23	1.11	Power (Lab 3)	R: Inv 3, F: HW 3
13	M	1/27	1.12/1.13	Sampling	
14	T	1/28	1.14-1.18	Finite populations, Cautions	Lab 3
15	W	1/29		**Review**	
	R	1/30		**Exam 1, Ch. 1**	
Chapter 2: Quantitative data					
16	M	2/3	2.1	Quantitative data (Lab 4)	
17	T	2/4	2.2, 2.3	Skewed data (Inv 4)	Lab 4
18	W	2/5	2.4	Sampling distributions for means	
19	R	2/6	2.5	*t*-distribution (Lab 5)	R: Inv 4, F: HW 4
20	M	2/10	2.6, 3.1	Prediction intervals	
Chapter 3: Comparing Proportions					
21	T	2/11	3.1	Two proportions (Inv 5)	Lab 5
23	W	2/12	3.2-3.4	Association, Confounding	
24	R	2/13	3.5	Randomization test (Lab 6)	R: Inv 5, F: HW 5
25	M	2/17		No class meeting	Project proposal?
26	T	2/18	3.6	Fisher's Exact Test (Inv 6)	Lab 6
27	W	2/19	3.7	Large sample procedure	
28	R	2/20	3.8	Relative Risk (Lab 7)	R: Inv 6, F: HW 6
29	M	2/24	3.9	Odds ratios	
30	T	2/25	3.10	Application	Lab 7
	W	2/26		**Review**	
	R	2/27		**Exam 2, Ch. 2 and 3**	
Chapter 4: Comparisons with Quantitative Variables					
31	M	3/3	4.2	Comparing population means	
32	T	3/4	4.3	Factors impacting p-value (Inv 7)	
33	W	3/5	4.4	Randomization tests	
34	R	3/6	4.5, 4.6	Comparing treatment means (L8)	R: Inv 7, F: HW 7
35	M	3/10	4.7	Transformations	
36	T	3/11	4.8	Paired designs (Inv 8)	Lab 8
37	W	3/12	4.9/4.10	Paired *t*-tests	
38	R	3/13	4.11	McNemar's Test	R: Inv 8, F: HW 8
			Final Exam March 15 (10:10-1pm?)		