Syllabus for Introduction to Statistics

Course Information

Semester: Fall 2023
Course ID & Section #:
Math-15-E5423
Instructor: Trevor Keiber
Day/Time: MW 12:20 – 1:30 pm
Location: Science 202
Course units: 4

Instructor Contact Information

Office location: Tutoring center (within the learning center)
Office hours: MW 12-1:30pm & Th 10:00am - 6:00 pm
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Catalog Description

An introduction to basic concepts of descriptive and inferential statistics, with emphasis on the meaning and use of statistical significance. Students will use probability techniques to make decisions via hypothesis testing and will estimate parameters using confidence intervals. The course includes applications from a variety of technical and social science fields.

Course Student Learning Outcomes *(from course outline of record)*

1. Accurately communicate statistical ideas using correct statistical notation, graphs, and vocabulary.
2. Use descriptive and inferential statistics to better understand real-world problems.
3. Demonstrate appropriate use of technology in making decisions based upon real-world data.
4. Read and interpret information that contains statistical analysis and be able to communicate these results.
5. Judge the validity of research reported in the mass media and peer reviewed journals.

Prerequisites/co-requisites/ recommended preparation

There is no prerequisite math course required to enroll in Math 15, however, it is expected that students will have familiarity with certain pre-algebra math concepts.

Educational Accessibility & Support

You may qualify if you have a physical, mental, sensory, or intellectual condition which causes you to struggle academically. Available services include extended test time, quiet testing environments, tutoring, counseling and advising, alternate formats of materials etc. . If you believe you might benefit from disability- or health-related services and accommodations, please contact Disability Services and Programs for Students (DSPS).

Evaluation & Grading Policy

Your final grade in the class is determined by the ratio of points that you earned to the total number of points in the class. All points hold equal weight regardless of if you earned them from written homework, activities, exams etc. Letter grades are assigned based on the following (generous) criteria:
A 100-90%, A- 89-87%, B+ 83-86%, B 78-82%, B- 75-77%, C+71-74%, C 67-73%, D/F 0-66%
The two quizzes will be taken during class while the midterm and final will likely be take-home exams. Written homework and activities are important aspects of this course and comprise more points relative to the exams. If you have test anxiety, you will be permitted to take the quizzes at the testing center. Please let me know in advance if there is a reason why you will need more time and I will accommodate you. This will be the approximate point breakdown for the course.
Homework and Activities 70%
Quiz 1: 5%
Midterm 10%
Quiz 2: 5%
Final Exam 10%

Graphing Calculator TI-83/34 etc.
You can always use a calculator for this class, the only catch is that I will not provide specific instruction on how to use it during the lecture. Instructions are available in the openstax textbook and on the internet, by default try youtube.

The internet
You will need access to the internet for this class to access canvas, the textbook and various other resources. There are many places you can go to on the internet, and I address several of them below. I ask that when one of your fellow students or myself are speaking you refrain from using your phone or computer so you can give your attention to the speaker.

Online statistical programs:
These include freely available online apps such as wolfram alpha, stat crunch, statistics kingdom, social science statistics, etc.
After teaching statistics for a few years, I have learned how incredibly useful these programs can be and I encourage the use of any or all these programs, including others that you may find. Several of these programs require you to only enter a list and a few other parameters and then produce extremely detailed solutions including graphs, figures and written summaries of data. Using this would certainly seem like cheating to someone who was making the figures on graph paper and using a calculator to perform the statical tests. My reasoning for allowing these programs is multifold:

- General comprehension: To use these programs accurately, you still need to understand a great deal of what is happening at a more general level. Such as being able to determine which statistical test to perform based on the type of data which was collected and the number of variables etc.
- Longevity: You will be able to use these programs, or possibly even better ones, long after you take this course since they will not go away and are not tied to any one software.
- Additional content: there is generally additional content generated from these programs, such as figures, alternative tests, etc. which can increase the depth and scope of your analysis.
- Verifiability: it is easy to compare the results from several of these programs to check for

reliability of your results.

- Source code: apps like statistics kingdom use R code and make it accessible so you can see how they generated the results if you or someone else knows that language.
- Explanations: these programs often provide explanations and even sample calculations showing how the results were obtained.
- Internal libraries: there are useful internal links within the programs which often include libraries of information including explanations, example problems, special considerations etc.
- Equity: The programs are easily accessible, so there is no way I could actually prevent people from using them so allowing their use creates more equity and less headache.
- Usefulness: Finally, and most importantly, knowing how to use these programs is a skill which may allow you to confidently use statistics in other capacities after this course. I believe that it is likely that most students will forget the details of knowing how to conduct a complete hypothesis test for, say, data comparing the weight of poodles raised in urban vs rural settings. However, I think that if you learn how to use statistics kingdom or other similar programs, you would likely be able to produce accurate results which you were confident with.

Academic integrity in a rapidly changing world

Please take a moment to read the following italicized passage since it is included in the syllabus template for all CR courses before reading what I have to say about this course in particular. You may notice that words like 'dishonesty' and 'intolerance' are used several times with the implication that there will likely be severe consequences for infractions left to the whim of your instructor.

In the academic community, the high value placed on truth implies a corresponding intolerance of scholastic dishonesty. In cases involving academic dishonesty, determination of the grade and of the student's status in the course is left primarily to the discretion of the faculty member. In such cases, where the instructor determines that a student has demonstrated academic dishonesty, the student may receive a failing grade for the assignment and/or exam and may be reported to the Chief Student Services Officer.

Okay, thanks for reading that. Due to recent technological innovations, there are now many more shades of gray with regards to academic dishonesty relative to when I first took statistics – which, if you are curious, was a time before smartphones when glaciers clung year-round to mount Shasta. I have tried to adapt to recent changes, but my feelings on academic integrity may be different than yours, which is why I present a few key points I consider especially relevant.

The use of AI for statistical tests:
The first question to address is: Can AI such as google bard or ChatGPT conduct statistical tests better than the currently available online statistical apps? In my experience the answer is definitively no, although I admit this may change in the future. ChatGPT will readily conduct statistical tests, but the results will probably not be useful to you since it gives python code as a solution, which you then need to externally compile. Even if you do compile the python code, you still will not be impressed since the results are also far less sophisticated, detailed and reliable than the online stats programs. The same goes for many other things such as making a histogram or boxplot of the data, there are simply better ways to do it other than by using AI.
My Policy: Try it out and let me know if it works for you. I will not deduct points for using AI in this

specific capacity, but I want to know if you are using this since your results will be different than almost everyone else's.

The use of AI for critical thinking assignments:
Statistical tests are not the entire discussion on AI, and I there are uses I frown upon for this class. I assign critical thinking problems to encourage you to think about the topics at a slightly deeper level, and AI generated responses take that learning experience away from you. Specifically, you can use AI to generate answers to my critical thinking homework questions based only on entering the prompt. But googling the question will also give you answers in a similarly superficial way, as will copying a friend's responses.
My Policy:

- Handwritten responses: Critical thinking assignments will not be accepted typed; you must write them by hand. This way you will at least read what you are copying and may be more inclined to change the words to reflect your own thoughts.
- Initial warning: Alternative assignments if I suspect that you either copied a friend's answers word for word, copied something from an internet search, or simply copied an AI generated response to the question, I will bring it to your attention discreetly to not embarrass you in front of the class. On the first verifiable offence, I will generally offer you the opportunity to redo the assignment more authentically or receive no points for it.
- Alternative assignments: Upon further infractions, you will be offered alternative online homework assignments via my open math instead of critical thinking assignments. This is not intended to be a punishment but is based on my belief that your time would be better spent solving problems if you are not actually thinking about the questions.

External help: Friends, family and tutors can be great resources to help you understand statistics. If you convince or pay someone to do your assignments for you, this is not okay. Instead of resorting to these measures, I suggest going to the tutoring center at CR where you can work with tutors who know the material and will help you learn the material.

Collaboration with other students:
I encourage you to work together on assignments other than the take-home exams. However, I expect that people turn in their own work and not present identical copies of assignments. Use common sense, it is easy for me to tell if the work is exactly the same in this instance. I will give you a warning or two before there are consequences but again, be responsible.

Late Work Policy

To be successful, you should try to get in the habit of turning in your assignments by the due date so that you do not fall behind in the class. In my experience, students who turn in most of their assignments on time generally excel, while those who work on late assignments during the lecture tend to perpetuate a spiral of stress and confusion.

Nearly every assignment will be due one week from the date it was assigned with a few exceptions that I will let you know about. You can turn in your work either by uploading it to canvas or by turning in a paper copy to me sometime by the start of the lecture it is due. I will not accept the assignment after the deadline without a compelling reason, so it is better to turn in partially completed work instead of completing nothing at all.

Admittedly, this seems like a pretty harsh policy so far. My goal is not to punish you, but to try and prevent the scenarios I encountered previously. I acknowledge that life is tough and complicated and provides ample reasons why you would not be able to complete assignments on time. Because of this, I am offering alternative assignments which you can complete if you are not able to turn in the original assignment. Generally, these are online homework assignments via My Open Math (MOM). I used to require students to do online homework, but because students had lukewarm feelings about it, I have moved away from requiring that you complete them. However, the assignments are all worthwhile and tied directly to the course material. Online homework will be available every week on Canvas. If you missed an assignment that week, simply complete enough points on the online homework and I will apply your score to the missing assignment. There will not be a late penalty if you are able to do this within a few weeks of when the assignment was due (specifically no late penalty before the associated exam or quiz.)

Finally, it is important to mention that there are several assignments which should not be turned in late such as the exams.

Daily Schedule

This is the tentative schedule for the course including the topics and corresponding textbook sections that I hope to cover in each lecture. Inevitably things will change as we adapt to events unfolding during the semester. You should use this as a guideline but refer to canvas for what we will actually be covering on a weekly basis.

Week #	Date	Chapter Sections	Topic & Notes
Unit 1			*Descriptive Statistics*
1	8/21	1.1,1.3	Introduction, Definitions, Types of Data,
1	8/23	2.1-2.3	Frequency Plots, Histograms
2	8/28	2.4-2.5	Center and Spread of Data, Boxplots, 5 Number Summary
2	8/30	2.6,2.7	Standard Deviation, Applications
3	9/4	NA	Holiday
3	9/6	3.1, 3.2	Probability: Terminology, Rules, Connection to Frequency Plots,
4	9/11	3.4, 3.5	Probability: Contingency Tables, Venn and Tree Diagrams
Unit 2			*Regression and correlation*
4	9/13	12.1, 12.2	Linear Regression
5	9/18	12.3, 12.4	Linear Regression Continued
5	9/20	12.5, 12.6	Linear Regression and Applications
6	9/25		Review activity + **Quiz 1**
Unit 3			*Hypothesis tests for categorical data*
6	9/27	1.2, 1.4	Sampling Methods
7	10/2	9.1, 9,2	Hypothesis testing
7	10/4	4.1-4.4	Discrete PDFs, Binomial Distribution
8	10/9	9.3	One sample proportion test
8	10/11	11.1, 11.2	Chi squared distribution and goodness of fit test
9	10/16	11.3,11.4,11.5	Tests for independence and homogeneity
9	10/18		Review activity + **Midterm**
Unit 4			*Hypothesis tests for a single mean*
10	10/23	5.1-5.3	Continuous PDFs: Uniform, exponential, and normal
10	10/25	6.1,6.2	Normal Distribution
11	10/30	7.1-7.3	Central Limit Theorem
11	11/1	8.1, 9.3	One Sample z test
12	11/6	8.2, 9.3	Student t distribution
12	11/8	8.1,8.2	Confidence Intervals for means
13	11/13		Review activity + **Quiz 2**
Unit 4			*Hypothesis Testing for two or more means*

13	11/15	10.1, 10.2	Two sample z test, two sample proportion test
14	11/20		Fall Break
14	11/22		Fall Break
15	11/27	10.3,10.4	Two sample t test and paired t test
15	11/29	13.1, 13.2	One-Way ANOVA and F Distribution
16	12/4	13.3,13.4	Test of several means or two variances
16	12/6	13.2-13.4	Activity and final exam review
17	12/11	Final Exam	Finals Week + **Final**

Disruptive behavior

Student behavior or speech that disrupts the instructional setting will not be tolerated. Disruptive conduct may include but is not limited to: unwarranted interruptions; failure to adhere to instructor's directions; vulgar or obscene language; slurs or other forms of intimidation; and physically or verbally abusive behavior. In such cases where the instructor determines that a student has disrupted the educational process, a disruptive student may be temporarily removed from class. In addition, the student may be reported to the Chief Student Services Officer or designee. The Student Code of Conduct (AP 5500) is available on the College of the Redwoods website. Additional information about the rights and responsibilities of students, Board policies, and administrative procedures is located in the College Catalog and on the College of the Redwoods website.

Setting Your Preferred Name in Canvas

Students have the ability to have an alternate first name and pronouns to appear in Canvas. Contact Admissions & Records to request a change to your preferred first name and pronoun. Your Preferred Name will only be listed in Canvas. This does not change your legal name in our records. See the Student Information Update form.

Canvas Information

Canvas Information

If using Canvas, include navigation instructions, tech support information, what Canvas is used for, and your expectation for how regularly students should check Canvas for your class.

-Log into Canvas at My CR Portal

For help logging in to Canvas, visit My CR Portal.

For help with Canvas once you're logged in, click on the Help icon on the left menu.

For tech help, email its@redwoods.edu or call 707-476-4160

Canvas online orientation workshop: Canvas Student Orientation Course (instructure.com)

Student Support Services

The following online resources are available to support your success as a student:

- CR-Online (Comprehensive information for online students)
- Library Articles & Databases
- Canvas help and tutorials
- -Online Student Handbook
- Online Tutoring Resources

Learning Resource Center includes the following resources for students

- Library Services to promote information literacy and provide organized information resources.
- Multicultural & Diversity Center
- Academic Support Center – offers tutoring and test proctoring for CR students.
- Student Tech Help – provides students with assistance around a variety of tech problems.