AMS 5: Statistics, Fall 2018.

MWF 2:40 – 3:45 pm, Earth&Marine B206

https://ams005-fall18-02.courses.soe.ucsc.edu/home

Required text: *Statistics,* 4th edition, by Freedman, Pisani and Purves.

Course Description: This course provides an introduction to statistics with an emphasis on instructive applications to the social and natural sciences. We will also study some elementary probability theory, and a certain amount of computation is inevitable, but in this course we will focus on understanding the ideas that motivate the computations and interpreting the numbers that the computations produce.

For a more detailed look at the topics we will discuss, please see the lecture schedule that follows.

Reading: The reading assignments listed with the lecture schedule are meant to be completed at least once ***before*** the corresponding lecture. The lectures are prepared based on the assumption that the students have done the reading, so they will be significantly easier to follow if you have read the material in advance. After the lecture, you should read the material again, in greater depth.

Homework: Assignments are listed in the lecture schedule. Homework will be not be collected or graded but most of the exam and quiz questions will be based on the homework. More importantly, working on the homework is one of the best ways to see how well you have mastered the material and to identify concepts and techniques on which you need to do more work .

Comment: Many of the chapters have 'lettered' exercise sets, you should consider these to be part of the reading — there are solutions to the lettered problem sets at the back of the book. The homework is assigned from the review problems (and special review problems) at the end of the chapters.

Sections: Sections are not mandatory, but are ***highly recommended***. Mastering the ideas and methods of this course requires discussion and practice. In section you will have the opportunity to engage in both activities under the guidance of an experienced Teaching Assistant. In particular, the TAs will review the homework problems in section and answer related questions.

Quizzes and Exams There will be two midterm exams and a comprehensive final exam (the dates are listed in the lecture schedule below). Additionally, there will be 'pop' quizzes in many of the lectures (10 - 20 quizzes throughout the quarter). The quizzes will be short — one or two questions based on recent material and related homework. Make-up quizzes will not be given (but you don't need to take them all for full quiz-credit).

Special Accommodations: UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please contact the Disability Resource Center, which offers services that are confidential and free of charge. Contact DRC by phone at ***831-459-2089*** or by email at ***drc@ucsc.edu***. If you have an Accommodation Authorization Letter from the DRC, please submit it to me privately during my office hours or by appointment, preferably within the first two weeks of the quarter. At that time, I would also like us to discuss ways we can ensure your full participation in the course.

Course grade: The quizzes contribute 20 percent to your overall score in the class, the two midterms contribute 40 percent and the final exam contributes the remaining 40 percent. Letter grades will correspond (approximately) to the following ranges:

Overall Score	Grade
90 – 100	A− to A+
80 – 89	B− to B+;
65 – 79	C to C+
60 - 64	C-
50 – 59	D
0 – 49	F

To pass the class, your overall score must be 65 or above and you must score at least 50% on the final exam.

CHEATING:

Cheating in any form — e.g., using a phone during an exam, copying from someone else on an exam, etc. — will not be tolerated. Students who help others cheat are also considered cheaters. Students caught cheating will be reported to the AMS department and to their college provost. In almost all cases, a student caught cheating will receive a failing grade, in addition to the administrative consequences decided by your provost. The administrative consequences of cheating can range from a warning to suspension, and in all cases, cheating is recorded in your academic record.

TIPS FOR SUCCESS

⋆ Come to all the lectures, and come prepared — read the assigned sections at least once before the lecture, so you have an idea of what we will be discussing in the lecture. You don't have to read the material in depth the first time through.

⋆ Read the material again after the lecture, this time in more depth. Read actively: take notes, make a list of questions to ask. Try working the examples in the book/supplementary notes on your own before reading the solutions.

⋆ Work on the homework together with the second reading. Make a note of the problems that you don't understand so that you can ask about them.

⋆ ***Ask questions:*** the more specific your question, the better and more helpful the answer is likely to be. You can ask questions in class, in section and during office hours.

⋆ ***Attend sections regularly***. You can prepare for section by making a list of the homework problems you find most challenging/confusing.

⋆ Take advantage of all the resources: lecture, section, MSI, office hours.

⋆ Study with friends for a few hours a week.

⋆ The standard for a 5-unit course at UCSC is 15 hours of studying a week. These 15 hours include the time for lectures and sections, but this still leaves close to 10 hours a week you should be spending with the material outside of class.

⋆ If you feel that you are getting lost, take action. Don't wait and hope 'it goes away'. Come to office hours or ask questions in class (or section) to clear up any confusion.

Lecture Schedule with Homework Assignments and *Exam Dates.*

Friday, 9-28: Introduction. Controlled experiments.
Reading: Chapter 1.
Homework. Chapter 2 Review Exercises: 3, 5, 6, 9.

Monday, 10-1: Observational studies.
Reading: Chapter 2.
Homework. Chapter 2 Review Exercises: 1, 2, 4, 7, 8, 11.

Wednesday, 10-3: Describing data: tables and graphs.
Reading: Chapter 3.
Homework. Chapter 3 Review Exercises: 1, 3, 4, 7, 8, 11.

Friday, 10-5: Describing data: statistics.
Reading: Chapter 4.
Homework. Chapter 4 Review Exercises: 2, 3, 4, 6, 7, 10.

Monday, 10-8 The normal distribution, part 1.
Reading: Chapter 5.
Homework. Chapter 5 Review Exercises: 1, 3, 4, 6, 8.

Wednesday, 10-10: Correlation.
Reading: Chapter 8 (see chapter 7 for a refresher on lines and their equations).
Homework. Chapter 8 Review Exercises: 1, 2, 3, 5, 10, 11.

Friday, 10-12: Correlation, continued.
Reading: Chapter 9.
Homework. Chapter 9 Review Exercises: 2, 3, 4, 8, 10, 11.

Monday, 10-15: Regression.
Reading: Chapters 10 and 11.
Homework. Chapter 10 Review Exercises: 2, 3, 5, 7, 8.
Chapter 11 Review Exercises: 1, 3.

Wednesday, 10-17: Regression, continued.
Reading: Chapters 11 and 12.
Homework. Chapter 11 Review Exercises: 5, 7, 11.
Chapter 12 Review Exercises: 2, 3, 8, 12.

Friday, 10-19: ***Midterm 1 — Chapters 1 - 5, 8 - 12.***

Monday, 10-22: Chance error and bias.
Reading: Chapters 6 and 19.
Homework. Chapter 6 Review Exercises: 3, 4.
Chapter 6 Special Review Exercises: 3, 9, 14.

Wednesday, 10-24: Probability I

Reading: Chapters 13.

Homework. Chapter 13 Review Exercises: 2, 3, 4, 6, 7, 8, 11.

Friday, 10-26: Probability II.

Reading: Chapters 13 and 14.

Homework. Chapter 14 Review Exercises: 1, 3, 4, 9, 11, 14.

Monday, 10-29: Probability III.

Reading: Chapters 14 and 15.

Homework. Chapter 15 Review Exercises: 1, 2, 3, 4, 8, 9, 10.

Wednesday, 10-31: The law of averages.

Reading: Chapter 16.

Homework. Chapter 16 Review Exercises: 1, 3, 4, 6, 7, 9.

Friday, 11-2: Expected value and standard error.

Reading: Chapter 17.

Homework. Chapter 17 Review Exercises: 1, 4, 5, 7, 10, 13.

Monday, 11-5: The normal distribution, part II.

Reading: Chapter 18.

Homework. Chapter 18 Review Exercises: 2, 3, 4, 5, 9, 10, 12, 14.

Wednesday, 11-7: ***Midterm 2 — Chapters 13 - 18.***

Friday, 11-9: Chance error in sampling.

Reading: Chapters 19 and 20.

Homework. Chapter 19 Review Exercises: 1, 2, 4, 6, 10.

Chapter 20 Review Exercises: 2, 3, 6, 7.

Monday, 11-12: ***Veterans day holiday***

Wednesday, 11-14: Confidence intervals, I.

Reading: Chapters 20 and 21.

Homework. Chapter 20 Review Exercises: 8, 12.

Chapter 21 Review Exercises: 2, 3, 4, 5, 9.

Friday, 11-16: Confidence intervals II.

Reading: Chapters 21 and 23.

Homework. Chapter 21 Review Exercises: 12, 15.

Chapter 23 Review Exercises: 1, 2, 3, 4, 5, 8, 9, 10.

Monday, 11-19: The Gauss model for measurement error.

Reading: Chapter 24.

Homework. Chapter 24 Review Exercises: 1, 3, 7, 9.

Wednesday, 11-21: Tests of significance, I.

Reading: Chapter 26.

Friday, 11-23 ***Thanksgiving holiday***

Monday, 11-26: Tests of significance, II.

Reading: Chapter 26.

Homework. Chapter 26 Review Exercises: 1, 2, 4, 6, 8, 11.

Wednesday, 11-28 Tests of significance, III.

Reading: Chapters 26 and 27.

Homework. Chapter 26 Exercise set F: 4, 5, 6.

Friday, 11-30: Tests of significance, IV.

Reading: Chapter 27.

Homework. Chapter 27 Review Exercises: 2, 3, 4, 5, 7.

Monday, 12-3: The Chi-Squared test.

Reading: Chapter 28.

Homework. Chapter 28 Review Exercises: 1, 2, 3.

Wednesday, 12-5: Tests of significance revisited.

Reading: Chapter 29.

Friday, 12-7: Catch-up and review.

Wednesday, 12-12: Final Exam: 4:00 – 7:00 pm