AMS 5: Statistics, Spring 2018.

MWF 2:40 – 3:45 pm, Earth&Marine B206
https://ams005-spring18-01.courses.soe.ucsc.edu/home

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Required text: *Statistics,* 4$^{\text{th}}$ 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 more 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.

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.

Homework: Assignments are listed in the lecture schedule with their due dates.

Late homework will not be accepted, but your lowest two scores will be dropped.

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 in section**. The TAs will also take attendance in section, and a good attendance record may help students' grades in borderline cases.

Exams: There will be three short exams throughout the quarter and a comprehensive final exam. The lowest short exam score will be dropped. See the lecture schedule for the dates of the exams.

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: Your homework contributes 20 percent to your overall score in the class, your two best short exams contribute 20 percent each 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
<u>and</u> you must score at least 50% on the final exam.*

<u>Comment:</u> *Your grade in the class is determined by your performance in the class, as assessed by the homework and exams, nothing else.* If you need a certain minimum grade for any reason, then you must earn it. The bottom line is that **all students are graded the same**.

We will do everything we can to help you succeed, so if you feel that you are falling behind or if you are concerned about your performance, please come see us (Dr. Katznelson and/or the Teaching Assistants) early in the quarter. *There is little that we can do to help you improve your grade near the end of the quarter, and nothing we can do after the final exam.*

CHEATING:

Cheating in any form (using unauthorized notes on tests or exams, copying from someone else, etc.) will not be tolerated. Any student caught cheating will be reported to the AMS department and to his or her college provost. In almost all cases, a student caught cheating will receive a failing grade. Students who help others cheat are also cheaters. Cheating devalues everyone's grades—you shouldn't tolerate it either.

TIPS FOR SUCCESS

★ **Come to all the lectures, and come prepared** — read the assigned chapters at least once before the lecture, so you have an idea of what we will be discussing in the lecture. Read the material again after the lecture, this time in more depth.

★ **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.

★ **Study with friends** for a few hours a week. Technical skills can be practiced alone, but concepts need to be *discussed*.

★ **The average student should spend 8-10 hours studying outside of class/section to be successful.** Spread those hours out — one to two hours several times a week is optimal.

★ **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.

Monday, 4-2: Introduction. Controlled experiments.

Reading: Chapter 1.

Wednesday, 4-4: Observational studies.

Reading: Chapter 2.

Friday, 4-6: Describing data: tables and graphs.

Reading: Chapter 3.

Homework Assignment 1, Due Friday, 4-6

Chapter 2 Review Exercises: 1, 2, 3, 4, 5, 7, 8, 9, 10, 11.

Monday, 4-9: Describing data: statistics.

Reading: Chapter 4.

Wednesday, 4-11: The normal distribution, part 1.

Reading: Chapter 5.

Friday, 4-13 Correlation.

Reading: Chapter 8 (see chapter 7 for a refresher on lines and their equations).

Homework Assignment 2, Due Friday, 4-13

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

Chapter 4 Review Exercises: 1, 3, 5, 7, 10.

Chapter 5 Review Exercises: 1, 3, 4, 6, 8.

Monday, 4-16: Review for Exam 1.

Reading: Chapters 1 - 5, 8.

Wednesday, 4-18:   ***Exam 1: Chapters 1 - 5, 8.***

Friday, 4-20: Correlation II

Reading: Chapter 9.

Monday, 4-23: Regression I.

Reading: Chapters 10 - 11.

Homework Assignment 3, Due Monday, 4-23

Chapter 8 Review Exercises: 1, 2, 3, 5, 10, 11.

Chapter 9 Review Exercises: 2, 3, 4, 8, 10, 11.

Wednesday, 4-25: Regression II.

Reading: Chapters 11 - 12.

Friday, 4-27: Chance error and bias.

Reading: Chapters 6 and 19.

Homework Assignment 4, Due Friday, 4-27

Chapter 10 Review Exercises: 2, 3, 4, 5, 7, 8, 10.

Chapter 11 Review Exercises: 1, 3, 4, 5, 6, 7.

Chapter 12 Review Exercises: 2, 3, 5, 8.

Monday, 4-30: Probability I

Reading: Chapter 13.

Wednesday, 5-2: Probability II.

Reading: Chapters 13 and 14.

Friday, 5-4: Probability III.

Reading: Chapters 14 and 15.

Homework Assignment 5, Due Friday, 5-4

Chapter 6 Review Exercises: 3, 4.   Chapter 6 Special Review Exercises: 3, 9, 14.

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

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

Monday, 5-7:   ***Exam 2: Chapters 9 - 14.***

Wednesday, 5-9: The law of averages.

Reading: Chapter 16.

Friday, 5-11: Expected value and standard error.

Reading: Chapter 17.

Homework Assignment 6, Due Friday, 5-11

Chapter 15 Review Exercises: 3, 4, 6, 10, 11.

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

Monday, 5-14: The normal distribution, part II.

Reading: Chapter 18.

Wednesday, 5-16: Chance error in sampling.

Reading: Chapters 19 (again) and 20.

Friday, 5-18: Confidence intervals, I.

Reading: Chapters 20 and 21.

Homework Assignment 7, Due Friday, 5-18

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

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

Chapter 19 Review Exercises: 1, 2, 4, 6, 7, 10.

Monday, 5-21: Confidence intervals II.

Reading: Chapters 21 and 23.

Wednesday, 5-23: **Exam 3: Chapters 16 - 23.**

Friday, 5-25: The Gauss model for measurement error.

Reading: Chapter 24.

Homework Assignment 8, Due Friday, 5-25

Chapter 20 Review Exercises: 2, 3, 6, 7, 8,12.

Chapter 21 Review Exercises: 2, 3, 4, 5, 8, 12, 15.

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

Monday, 5-28: **Memorial Day**

Wednesday, 5-30: Tests of significance – z-tests

Reading: Chapter 26.

Friday, 6-1 Tests of significance – t tests

Reading: Chapter 26.

Monday, 6-4: Two sample tests.

Reading: Chapter 27.

Homework Assignment 9, Due Monday, 6-5

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

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

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

Wednesday, 6-6: The Chi-Squared test – in broad strokes

Reading: Chapter 28.

Friday, 6-8: Tests of significance revisited

Reading: Chapter 29.

Tuesday, 6-12: **Final Exam: 7:30 – 10:30 pm**