

AMS 5: Statistics, Winter 2017.

MWF 12:00 – 1:05 pm, Baskin Engineering 101

<https://ams005-winter17-02.courses.soe.ucsc.edu/home>

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Office hours: MWF 9:30 - 11:00 am

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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.

Quizzes: There will be four short quizzes in class, one every other Friday, and a comprehensive final exam. The quiz/exam dates are listed in the lecture schedule that follows. Make-up quizzes will *not* be given, but your lowest score will be dropped.

Homework: Assignments are listed in the lecture schedule. These assignments will *not* be collected or graded. Working on the homework is crucial to mastering the material and succeed in the class. Moreover, *the quizzes will be based on the homework.*

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 mainly 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 (on which the quizzes are based) in section.*

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 (three highest) quiz scores contribute 60 percent to your overall score in the class and the final exam contributes 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 (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 and ECON departments 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 considered cheaters.

*Cheating devalues everyone's grades.
You should not tolerate it either.*

Lecture Schedule with Homework and Quiz/Exam Dates.

Monday, 1-9: Introduction. Controlled experiments.

Reading: Chapter 1.

Homework. Chapter 2, review exercises: 3, 5, 6, 9.

Wednesday, 1-11: Observational studies.

Reading: Chapter 2.

Homework. Chapter 2, review exercises: 1, 4, 7, 8, 11.

Friday, 1-13: Describing data: tables and graphs.

Reading: Chapter 3.

Homework. Chapter 3 review exercises: 1, 2, 4, 5, 7, 8, 10, 11.

Monday, 1-16: *Holiday (Martin Luther King day)*

Wednesday, 1-18: Describing data: statistics.

Reading: Chapter 4.

Homework. Chapter 4 review exercises: 1, 2, 3, 4, 5, 7, 9, 10, 12.

Friday, 1-20 The normal distribution, part 1. *Quiz 1*

Reading: Chapter 5.

Homework. Chapter 5 review exercises: 1, 2, 3, 4, 5, 6, 8, 9, 10,

Monday, 1-23: Correlation.

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

Homework. Chapter 8 review exercises: 1, 2, 4, 5, 7, 10, 11.

Wednesday, 1-25: Correlation, continued.

Reading: Chapter 9.

Homework. Chapter 9 review exercises: 2, 3, 4, 7, 8, 10, 11.

Friday, 1-27: Regression.

Reading: Chapters 10 and 11.

Homework. Chapter 10 review exercises: 1, 2, 3, 5, 7, 9. Chapter 11 review exercises: 1, 3, 4.

Monday, 1-30: Regression, continued.

Reading: Chapters 11 and 12.

Homework. Chapter 11 review exercises: 5, 6, 7, 12. Chapter 12 review exercises: 1, 2, 3, 7, 8.

Wednesday, 2-1: Chance error and bias.

Reading: Chapters 6 and 19.

Homework. Chapter 6 review questions: 2, 3, 4, Chapter 19 review exercises: 2, 3, 4, 12.

Friday, 2-3: Probability I. *Quiz 2*

Reading : Chapter 13.

Homework. Chapter 13 review questions: 1, 3, 5, 6, 7, 8, 9.

Monday, 2-6: Probability II

Reading: Chapters 13 and 14.

Homework. Chapter 13 review questions: 9, 10, 12. Chapter 14 review questions: 1, 2, 3, 5, 7.

Wednesday, 2-8: Probability III.

Reading: Chapter 14.

Homework. Chapter 14 review questions: 8, 9, 11, 12, 13, 14 (Exercise 13 is a bit challenging, but not terrible, and 14 isn't challenging *per se*, but does challenge one's usual intuition).

Friday, 2-10: Probability IV.

Reading: Chapter 15.

Homework. Chapter 15 review questions: 1, 2, 3, 5, 6, 8, 11.

Monday, 2-13: The 'law of averages'.

Reading: Chapter 16.

Homework. Chapter 16 review questions: 1, 2, 3, 4, 6, 7, 9.

Wednesday, 2-15: Expected value and standard error.

Reading: Chapter 17.

Homework. Chapter 17 review questions: 1, 4, 5, 7, 8, 10, 11, 13.

Friday, 2-17: The normal distribution, part II. *Quiz 3*

Reading: Chapter 18.

Homework. Chapter 18 review questions: 2, 3, 4, 5, 6.

Monday, 2-20: *Holiday (Presidents day)*

Wednesday, 2-22: The normal distribution, part II, continued.

Reading: Chapter 18.

Homework. Chapter 18 review questions: 8, 9, 10, 12, 13, 14, 15.

Friday, 2-24: Chance error in sampling.

Reading: Chapters 19 and 20.

Homework. Chapter 19 review exercises: 1, 5, 6, 7. Chapter 20 review exercises: 2, 3, 5, 7.

Monday, 2-27: Confidence intervals, I.

Reading: Chapters 20 and 21.

Homework. Chapter 20 review exercises: 4, 6, 8, 12. Chapter 21 review exercises: 1, 2, 3, 4, 5.

Wednesday, 3-1: Confidence intervals II.

Reading: Chapters 21 and 23.

Homework. Chapter 21 review exercises: 8, 12, 13, 15. Chapter 23 review exercises: 1, 2, 3, 4, 5, 7, 8, 9.

Friday, 3-3: The Gauss model. *Quiz 4*

Reading: Chapter 24.

Homework. Chapter 24 review exercises: 1, 2, 3, 4, 5, 7, 10.

Monday, 3-6: Tests of significance, I.

Reading: Chapter 26.

Homework. Chapter 26 review exercises: 1, 2, 5, 6, 7.

Wednesday, 3-8: Tests of significance, II.

Reading: Chapter 26.

Homework. Chapter 26 review exercises: 4, 8, 10, 11.

Friday, 3-10 The t-test.

Reading: Chapter 26.

Homework. Chapter 26 exercise set F: 1, 4, 5, 6, 7.

Monday, 3-13: Comparing two averages or two percentages.

Reading: Chapter 27.

Homework. Chapter 27 review exercises: 2, 3, 4, 5, 7, 9.

Wednesday, 3-15: The Chi-Squared test.

Reading: Chapter 28.

Homework. Chapter 28 review exercises: 1, 2, 3, 5, 6.

Friday, 3-17: Tests of significance revisited.

Reading: Chapter 29.

Wednesday, 3-22: *Final Exam: 12:00 – 3:00 pm*