

Statistical Methods for the Biological, Environmental and Health Sciences

TWTTh 9:00 – 11:45 am, Physical Sciences 136.

<https://ams007-summer16-02.courses.soe.ucsc.edu/home>**Instructor:** Yonatan Katznelson**Office:** Baskin 361B**Phone:** 459 - 1046 (don't leave messages - send email if I don't answer)**Email:** yorik@ucsc.edu**Required text:** *Biostatistics for the biological and health sciences*, by Triola & Triola.

Course Description: This course provides an introduction to probability and statistics with an emphasis on applications to the natural and social sciences. You will learn to do various calculations, but the principal goal is understanding the concepts and learning to interpret the (numerical) results. Please see the lecture schedule that follows for a more detailed list of topics.

Quizzes/Exams: There will be four short quizzes, one each Thursday, and a comprehensive final exam on the last day of the course (also a Thursday). Make-up quizzes will *not* be given, but your lowest quiz score will be dropped.

Reading and homework: The assigned reading (on the lecture schedule that follows) is meant to be completed *before* the lecture that covers that material. You should use the homework (also listed in the syllabus) for each chapter to test your understanding and review after the lecture. Homework will not be collected or graded, but questions on the quizzes will be similar to homework problems.

Sections: Sections will be scheduled after consulting with the students.

Computer Lab: Enrollment in AMS 7L is a co-requisite. The material is linked, but you will receive a separate grade for 7L. This is an on-line lab, supervised by a separate instructor (Annalisa Cadonna).

Course grade: Your 3 best quiz scores contribute 60% to your course score and the final exam contributes 40%. Letter grades will correspond (approximately) to the following ranges:

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

Students with disabilities: If you qualify for classroom/exam accommodations because of a disability, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me as soon as possible, preferably within the first few days of the course. Contact DRC by phone at *831-459-2089* or by email at *drc@ucsc.edu* for more information.

Key Summer Session dates:**Last day to enroll:** Thursday, July 28**Last day to drop:** Monday, August 1 (with refund)**Last day to withdraw:** (no refund) Friday, August 12

Lecture Schedule (subject to change)
with Quiz and Exam Dates (not subject to change).

Tuesday, 7-26: Introduction; Data types and experimental design; Frequency distributions; visualization.

Reading: Chapter 1; Sections 2.1-2.3.

Homework:

1.2: 1, 2, 5, 7, 8, 9, 13, 17, 18, 19;

1.3: 1 - 34;

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

2.2: 1, 2, 3, 5, 11.

2.3: 1, 2, 3, 11, 13, 15.

Wednesday, 7-27: Descriptive statistics; Introduction to probability.

Reading: Sections 2.4 - 2.7; 3.1 - 3.2

Homework:

2.4: 1, 5, 7, 9, 17*, 19.

2.5: 1, 5, 9, 17*, 21.

2.6: 1, 5, 7, 9, 23.

2.7: 1, 2, 11.

Chapter 2 Review Exercises: 1, 2, 3, 5.

3.2: 1, 3, 5, 9, 10, 11, 13.

Thursday, 7-28: Probability ***Quiz 1*** (Chapters 1 - 2)

Reading: Sections 3.3 - 3.7

Homework.

3.3: 3, 5, 7, 9, 13, 19.

3.4: 5, 7, 9, 13, 17, 19.

3.5: 3, 7, 9, 15, 21, 25.

3.6: 1, 3, 8.

Chapter 3 Review Exercises: 3, 5, 7, 9, 13.

Tuesday, 8-2: Random variables and probability distributions.

Reading: Chapter 4; Sections 5.1 - 5.2.

Homework.

4.2: 3, 5, 9, 11.

4.3: 3, 5, 15, 17, 23, 27, 29.

4.4: 3, 5, 7, 11, 13.

4.5: 1, 5, 9.

Chapter 4 Review Exercises: 1, 2, 3, 4.

5.2: 1, 7, 9, 15, 23, 29, 31, 37, 39.

Wednesday, 8-3: Normal distribution; sampling distributions; normal approximation.

Reading: Sections 5.3 - 5.7. **Pay particular attention to 5.4 - 5.6.**

Homework.

5.3: 1, 3, 7, 11, 17.

5.4: 1, 3, 5, 9.

5.5: 1, 5, 7, 11.

5.6: 1, 3, 7, 9, 11, 15, 21, 23.

5.7: 1 - 4, 5, 9 (for 5 and 9, use JMP and the data set FHEALTH on the Supplements page).

Chapter 5 Review Exercises: 1, 2, 3, 5, 7 (for 7, use JMP and the data set BEARS on the Supplements page).

Thursday, 8-4: Confidence intervals for proportions **Quiz 2** (Chapters 3 - 5)

Reading: Sections 6.1 - 6.2.

Homework.

6.2: 1, 3, 5, 9, 13, 15, 17, 19, 21, 23, 27, 33, 37.

Tuesday, 8-9: Confidence intervals for means; hypothesis tests.

Reading: Sections 6.3 - 6.4; 7.1 - 7.3.

Homework.

6.3: 1, 3, 5, 7, 9, 13, 15, 17, 21, 25, 29.

6.4: 1, 3, 5, 7, 9, 15, 17, 25. For 25, import the data set YEAST.txt from the supplements page into JMP and let JMP do the numerical work.

Chapter 6, Review Exercises: 1, 2, 4, 6.

7.2: 1, 3, 5, 9, 13, 17, 19, 23, 27, 29, 33, 35, 37.

7.3: 1, 3, 7, 9, 17.

Wednesday, 8-10: Hypothesis tests (cont.)

Reading: Sections 7.4 - 7.5; 8.1 - 8.2.

Homework.

7.4: 1, 3, 7, 11.

7.5: 1, 3, 5, 7, 9, 15, 17, 21.

Chapter 7 Review Exercises: 1, 2, 3, 5.

Thursday, 8-11: **Quiz 3** (Chapters 6 - 7)

Reading: 8.1 - 8.3

Homework.

8.2: 5, 7, 8, 9, 13, 19.

Tuesday, 8-16: Hypothesis tests (cont.); correlation and regression.

Reading: Sections 8.3 - 8.4; 9.1 - 9.3.

Homework.

8.3: 1, 3, 5, 9, 11, 21.

8.4: 7, 9, 11.

Chapter 8 Review Exercises: 1, 5, 6.

9.2: 1, 3, 22 - 25.

9.3: 1, 3, 5, 9, 23.

Wednesday, 8-17: Regression (cont.).

Reading: Sections 9.3 - 9.5.

Homework.

9.4: 1, 3, 5, 7, 8, 17.

9.5: 1, 3, 5, 7.

Chapter 9 Review Exercises: 2, 3(b,c), 5(b,c), 6. (Suggestion: for all of these problems, type the data into JMP and let it do the heavy computational lifting. Answer the questions based on the JMP output).

Thursday, 8-18: Chi-square tests. *Quiz 4* (Chapters 8 - 9)

Reading: Sections 10.1 - 10.2.

Homework.

10.2: 1, 3, 7, 15.

Chapter 10 Review Exercises: 1.

Tuesday, 8-23: Chi-square tests (cont.); ANOVA

Reading: Section 10.3; Sections 11.1 - 11.2.

Homework.

10.3: 1, 5, 11.

Chapter 10 Review Exercises: 2.

11.2: 1, 3, 7.

For 7: enter the data from the table into JMP using two columns, one labeled 'Head' and one labeled 'Car' (or choose your own names). The numbers go in the Head column and the (corresponding) car types go in the Car column. Then choose the 'Fit Y by X' option from the Analyze menu. Enter Head for Y and Car for X. Finally, select the Means/Anova option from the red triangle menu. Find the necessary information.

Wednesday, 8-24: Review

Thursday, 8-25: *FINAL EXAM* (Comprehensive).