



QBIO 305 Statistics for Biological Sciences

Units: 4

Spring 2024 Semester

Lecture: Tuesdays and Thursdays, 11:00am – 12:20pm

Location: ZHS 352

Discussion: Mondays 1:00 – 1:50pm (RRI 321),
or Mondays 2:00 – 2:50pm (RRI 301),
or Wednesdays 1:00 – 1:50pm (RRI 321)

Instructor: Peter Calabrese

Office: RRI 404B

Office Hours: Mondays 3:40 – 4:30,
Tuesdays 2:10 – 3:00,
Wednesdays 3:40 – 4:30,
or by appointment

Contact Info: petercal@usc.edu, 213-740-2434

For office hours, I will be in my office and I will also be on Zoom (<https://usc.zoom.us/j/4898518195>). It is up to you if you want to meet in person or online

Teaching Assistants:

Wenxuan Zuo

Office: RRI 416B

Office Hours: TBD

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Yuqiu Wang

Location: TBD

Office Hours: TBD

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Dallace Francis

Office: RRI 416B

Office Hours: TBD

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Course Description

Statistics for Biological Sciences is an introductory course in statistics addressed to students in the life sciences. The course uses real data from life sciences. Understanding statistics is essential for studying modern biology.

Learning Objectives

The learning objective is to illustrate statistical reasoning in biological science and medicine. The students will learn probability models, experimental design, statistical analyses, and interpretation of results. In addition, students will be introduced to R (a free computer program for statistical computing and graphics).

Prerequisite(s): none

Co-Requisite(s): none

Concurrent Enrollment: none

Recommended Preparation: none

Course Notes

This course can be taken either for a letter grade or for credit/no credit. Lecture slides will be posted on Blackboard.

Technological Proficiency and Hardware/Software Required

Students will be introduced to R (a free computer program for statistical computing and graphics), so students will need access to a computer. In addition, students will need a calculator for exams (this calculator cannot be on their cellphones, any other type is fine).

Required Readings and Supplementary Materials

Statistics for the Life Sciences by M.L. Samuels, J.A. Witmer and A. Schaffner. Prentice Hall, 5th Edition. This textbook can be purchased at the campus store.

Assignments

There will be weekly homework from the textbook due on most Tuesdays. There will also be six R assignments; these R assignments will be due on Thursdays. Homework and R assignments will be posted on Blackboard. Homework and R assignments will also be submitted on Blackboard; they are due before midnight (California time) on the date specified. The TAs will grade for accuracy.

Examinations

There will be two midterm exams and one final exam. All exams will be in-person.

Grading Breakdown

Assessment Tool (assignments)	% of Grade
Homework	25
R assignments	15
Midterm Exam 1	15
Midterm Exam 2	15
Final Exam	30
TOTAL	100

Grading Timeline

Homework, R assignments, and exams will be graded within one to two weeks of submission. Grades will be entered on Blackboard.

Additional Policies

You can work together on the HW and the R assignments (every student must submit their own assignment). A 50% grade deduction will be imposed for late homework, and no homework later than one week will be accepted. You **cannot** work together on the exams. All exams will occur as scheduled: there will be no make-up exams. Note particularly that university regulations strictly regulate the final exam date.

The professor reserves the right to make changes to the syllabus; these changes will be announced as early as possible so that students can adjust their schedules.

Course Schedule: A Weekly Breakdown

	Topics	Readings	Deliverables
Week 1	Introduction, Chapter 1 Chapter 2, Description of Samples and Populations	pp 1 – 26 pp 27 – 59	(no HW)
Week 2	Chapter 2, Description of Samples and Populations Chapter 3, Probability and Binomial Distribution	pp 59 – 82 pp 83 – 93	HW
Week 3	Chapter 3, Probability and Binomial Distribution Chapter 3, Probability and Binomial Distribution	pp 94 – 102 pp 102 – 115	HW
Week 4	Chapter 4, Normal Distribution Chapter 5, Sampling Distribution	pp 122 – 140 pp 146 – 169	HW
Week 5	Chapter 6, Confidence Intervals Lecture on R (not in textbook)	pp 171 – 204	HW
Week 6	Chapter 6; Poisson + Bootstrap (not in textbook) First Midterm Exam: Thursday, February 15	pp 205 – 208, 211 – 222	HW Exam
Week 7	Chapter 7, Comparing Two Independent Samples Chapter 7, Comparing Two Independent Samples	pp 223 – 248 pp 249 – 275	HW R project #1
Week 8	Chapter 7, Wilcoxon-Mann-Whitney Test Chapter 8, Paired Test	pp 281 – 306 pp 307 – 318	HW
Week 9	Chapter 8, Paired non-parametric tests Chapters 9, Goodness-of-fit	pp 325 – 337 pp 355 – 365	HW R project #2
Spring Break March 11 – 15			
Wk 10	Chapter 9, Chi-squared Chapter 10, Relationships	pp 368 – 382 pp 383 – 401, 407 – 412	HW R project #3
Wk 11	Chapter 11, ANOVA Chapter 11, ANOVA	pp 442 – 454 pp 455 – 465, 478 – 487	HW R project #4
WK 12	Lecture on R; Statistics in the news (not in textbook) Second Midterm Exam: Thursday, April 4		HW Exam
Wk 13	Chapter 12, Correlation Chapter 12, Linear Model	pp 511 – 524 pp 525 – 560	HW R project #5
Wk 14	Multivariate analysis (not in textbook) Multivariate analysis (not in textbook)		HW
Wk 15	Multivariate analysis (not in textbook) Review		HW R project #6
Final Exam: Tuesday, May 7, 11am – 1pm			

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in SCampus in Part B, Section 11, “Behavior Violating University Standards” policy.usc.edu/scampus-part-b. Other forms of academic dishonesty are equally unacceptable. See additional information in SCampus and university policies on scientific misconduct, policy.usc.edu/scientific-misconduct.

Support Systems:

Counseling and Mental Health - (213) 740-9355 – 24/7 on call
studenthealth.usc.edu/counseling

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

National Suicide Prevention Lifeline - 1 (800) 273-8255 – 24/7 on call
suicidepreventionlifeline.org

Free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week.

Relationship and Sexual Violence Prevention Services (RSVP) - (213) 740-9355(WELL), press “0” after hours – 24/7 on call
studenthealth.usc.edu/sexual-assault

Free and confidential therapy services, workshops, and training for situations related to gender-based harm.

Office of Equity and Diversity (OED) - (213) 740-5086 | Title IX – (213) 821-8298
equity.usc.edu, titleix.usc.edu

Information about how to get help or help someone affected by harassment or discrimination, rights of protected classes, reporting options, and additional resources for students, faculty, staff, visitors, and applicants.

Reporting Incidents of Bias or Harassment - (213) 740-5086 or (213) 821-8298
usc-advocate.symplicity.com/care_report

Avenue to report incidents of bias, hate crimes, and microaggressions to the Office of Equity and Diversity | Title IX for appropriate investigation, supportive measures, and response.

The Office of Disability Services and Programs - (213) 740-0776
dsp.usc.edu

Support and accommodations for students with disabilities. Services include assistance in providing readers/notetakers/interpreters, special accommodations for test taking needs, assistance with architectural barriers, assistive technology, and support for individual needs.

USC Campus Support and Intervention - (213) 821-4710

campussupport.usc.edu

Assists students and families in resolving complex personal, financial, and academic issues adversely affecting their success as a student.

Diversity at USC - (213) 740-2101

diversity.usc.edu

Information on events, programs and training, the Provost's Diversity and Inclusion Council, Diversity Liaisons for each academic school, chronology, participation, and various resources for students.

USC Emergency - UPC: (213) 740-4321, HSC: (323) 442-1000 – 24/7 on call

dps.usc.edu, emergency.usc.edu

Emergency assistance and avenue to report a crime. Latest updates regarding safety, including ways in which instruction will be continued if an officially declared emergency makes travel to campus infeasible.

USC Department of Public Safety - UPC: (213) 740-6000, HSC: (323) 442-120 – 24/7 on call

dps.usc.edu

Non-emergency assistance or information.