QBIO 305 Statistics for Biological Sciences

Units: 4
Spring 2025 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 321),
or Wednesdays 1:00 – 1:50pm (RRI 321),

Instructor: Peter Calabrese
Office: RRI 404B
Office Hours: Mondays 3:40 – 4:30,
Tuesdays 12:40 – 1:30,
Wednesdays 3:40 – 4:30,
Thursdays 12:40 – 1:30,
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:

George Wang
Office Hours:
Location: MCB Lobby
Contact Info: gwang@usc.edu

Yingfei Wang
Office Hours:
Location: MCB Lobby
Contact Info: yingfei@usc.edu

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 Brightspace.

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 Tuesdays. There will also be multiple R assignments; these R assignments will be due on Thursdays. Homework and R assignments will be posted on Brightspace. Homework and R assignments will also be submitted on Brightspace; 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	15
R assignments	10
Midterm Exam 1	20
Midterm Exam 2	20
Final Exam	35
TOTAL	100

Grading Timeline

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

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 and Chapter 1	pp 1 – 26	(no HW)
1/13-1/17	Chapter 2, Description of Samples and Populations	pp 27 – 59	
Week 2	Chapter 2, Description of Samples and Populations	pp 59 – 82	HW 1
1/20-1/24	Chapter 3, Probability and Binomial Distribution	pp 83 – 93	
Week 3	Chapter 3, Probability and Binomial Distribution	pp 94 – 102	HW 2
1/27-1/31	Finish Chapter 3 and short introduction to R	pp 102 – 115	
Week 4	Chapter 4, Normal Distribution	pp 122 – 140	HW 3
2/3-2/7	Chapter 5, Sampling Distribution	pp 146 – 169	
Week 5	Chapter 6, Confidence Intervals	pp 171 – 204	HW 4
2/10-2/14	Lecture on R		
Week 6	Finish Chapter 6, Bootstrap, Poisson	pp 205 – 208, 211 – 222	HW 5
2/17-2/21	**Midterm Exam #1: Thursday, Feb. 20**		Exam
Week 7	Chapter 7, Comparing Two Independent Samples	pp 223 – 248	HW 6
2/24-2/28	Chapter 7, Comparing Two Independent Samples	pp 249 – 275	R proj 1
Week 8	Chapter 7, Wilcox-Mann-Whitney Test	pp 281 – 306	HW 7
3/3-3/7	Chapter 8, Paired Test	pp 307 – 318	
Week 9			
3/10-3/14	Chapter 8, Paired non-parametric tests	pp 325 – 337	HW 8
	Chapter 9, Categorical Data	pp 355 – 365	R proj 2
3/17-3/21	**Spring Break**		
Week 10			
3/24-3/28	Chapter 9, Categorical Data	pp 368 – 382	HW 9
	Chapter 10, Chi-Squared Test	pp 383 – 401, 407 – 412	R proj 3
Week 11	Statistics in the News		HW 10
3/31-4/4	**Midterm Exam #2: Thursday, April 3**		Exam
Week 12	Chapter 11, ANOVA	pp 442 – 454	
4/7-4/11	Chapter 11, ANOVA	pp 455 – 465, 478 – 487	R proj 4
Week 13	Chapter 12, Correlation and Regression	pp 511 – 524	HW 11
4/14-4/18	Chapter 12, Correlation and Regression	pp 525 – 560	R proj 5
Week 14	Multivarate analysis		HW 12
4/21-4/25	Multivariate analysis		R proj 6
Week 15	Multivariate analysis		
4/28-5/2	Review		

Final Exam: Tuesday, May 13, 8:00 – 10:00am

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.