QBIO 305 Statistics for Biological Sciences

Units: 4
Spring 2023 Semester
Lecture: Mondays and Wednesdays, 3:30 – 4:50pm
Location: RRI 101
Discussion: Tuesdays 2:00 – 1:50pm RRI 301,
Or Thursdays 2:00 – 2:50pm RRI 301,

Instructor: Peter Calabrese
Office: RRI 404B
Office Hours: TBD,
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:
TBD

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. Homework assignments and 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 a computer. In addition, students will need a calculator (any type).

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.

Description and Assessment of Assignments
There will be weekly homework, quizzes most weeks, two R projects, two midterm exams, and one final exam.

Grading Breakdown

Assessment Tool (assignments)	Points	% of Grade
Homework (lowest one dropped)		20
Quizzes (lowest one dropped)		15
R projects		10
Midterm Exam 1		15
Midterm Exam 2		15
Final Exam		25
TOTAL		100

Assignment Submission Policy

Homework will be due on Tuesdays. Quizzes will be on Thursdays. R Projects and exams will be due on the days specified.

Grading Timeline

Homework, quizzes, R projects, and exams will be graded within one week of submission. Grades will be entered on Blackboard.

Additional Policies

You can work together on the HW (every student must submit their own assignment). You cannot work together on the quizzes or exams. A 50% grade deduction will be imposed for late homework, and no homework later than one week will be accepted. All examinations will occur as scheduled: there will be no make-up examinations. Note particularly that university regulations strictly regulate the final examination 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
NOTE: These dates (including the dates of the midterms) are subject to change. I will post a final updated syllabus closer to the start of the semester.

	Topics/Daily Activities	Readings/Preparation	Deliverables
Week 1	Introduction, Chapter 1 Chapter 2, Description of Samples and Populations	pp 1 – 26 pp 27 – 59	(no homework) (no quiz)
Week 2	**MLK University Holiday** Chapter 2, Description of Samples and Populations	 pp 59 – 82	Homework Quiz
Week 3	Chapter 3, Probability and Binomial Distribution Chapter 3, Probability and Binomial Distribution	pp 83 – 93 pp 94 – 102	Homework Quiz
Week 4	Chapter 3, Probability and Binomial Distribution Chapter 4, Normal Distribution	pp 102 – 115 pp 122 – 140	Homework Quiz
Week 5	Chapter 5, Sampling Distribution Chapter 6, Confidence Intervals	pp 146 – 169 pp 171 – 204	Homework Quiz
Week 6	Lecture on R Chapter 6, Confidence Intervals; Poisson and Bootstrap (not in textbook)	 pp 205 – 208, 211 – 222	Homework Quiz
Week 7	**President's Day University Holiday** **First Midterm Exam**		Homework **First Midterm Exam**
Week 8	Chapter 7, Comparing Two Independent Samples Chapter 7, Comparing Two Independent Samples	pp 223 – 248 pp 249 – 275	Homework (no quiz)
Week 9	Chapter 7, Wilcox-Mann-Whitney Test Chapter 8, Paired t-test	pp 281 – 306 pp 307 – 318	Homework Quiz
	Spring Break **March 12 – 19**		
Week 10	Chapter 8, Paired non-parametric tests Chapter 8, Aggregate viewpoint; Chapter 9, Estimate of Proportion	pp 325 – 337 pp 336 – 340, 355 – 365	Homework **R Project #1** (no quiz)
Week 11	Chapter 9, Goodness-of-fit Chapter 10, Relationships	pp 368 – 382 pp 383 – 401, 407 – 412	Homework Quiz
Week 12	Chapter 11, ANOVA Chapter 11, ANOVA	pp 442 – 454 pp 455 – 465, 478 – 487	Homework Quiz
Week 13	Additional topics (not in textbook) **Second Midterm Exam**		Homework **Second Midterm Exam**
Week 14	Chapter 12, Correlation Chapter 12, Linear Model	pp 511 – 524 pp 525 – 536	Homework (no quiz)
Week 15	Chapter 12, Guidelines Multivariate analysis (not in textbook)	pp 537 – 560	Homework **R Project #2** (no quiz)
FINAL EXAM	Friday, May 5, 2:00pm – 4:00pm		

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.