



## **QBIO 305 Statistics for Biological Sciences**

**Units:** 4

**Fall 2023 Semester**

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

**Location:** ZHS 252

**Discussion:** Mondays 1:00 – 1:50pm RRI 321,  
or Mondays 2:00 – 2:50pm GFS 229,  
or Wednesdays 1:00 – 1:50pm RRI 321,

**Instructor:** Peter Calabrese

**Office:** RRI 404B

**Office Hours:** TBD,  
or by appointment

**Contact Info:** [petercal@usc.edu](mailto: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

**This syllabus is preliminary. I will issue an updated syllabus closer to the beginning of classes.**

### **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. 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 from the textbook. Most weeks there will also be a quiz or an R assignment. In addition, there will be two midterm exams and one final exam. The TAs will grade for accuracy.

## Grading Breakdown

Assessment Tool (assignments)	% of Grade
Homework	20
Quizzes	12.5
R assignments	12.5
Midterm Exam 1	15
Midterm Exam 2	15
Final Exam	25
<b>TOTAL</b>	<b>100</b>

### Assignment Submission Policy

Homework will be due on Tuesdays. Quizzes and R assignments will be due on Thursdays. Exams will be due on the days specified.

### Grading Timeline

Homework, quizzes, R assignments, 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 and the R assignments (every student must submit their own assignment). You **cannot** work together on the quizzes or the 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

	<b>Topics</b>	<b>Readings</b>	<b>Deliverables</b>
Week 1	Introduction, Chapter 1 Chapter 2, Description of Samples and Populations	pp 1 – 26 pp 27 – 59	(no HW) (no quiz)
Week 2	Chapter 2, Description of Samples and Populations Chapter 3, Probability and Binomial Distribution	pp 59 – 82 pp 83 – 93	HW Quiz
Week 3	Chapter 3, Probability and Binomial Distribution Chapter 3, Probability and Binomial Distribution	pp 94 – 102 pp 102 – 115	HW Quiz
Week 4	Chapter 4, Normal Distribution Chapter 5, Sampling Distribution	pp 122 – 140 pp 146 – 169	HW Quiz
Week 5	Chapter 6, Confidence Intervals Lecture on R (not in textbook)	pp 171 – 204	HW Quiz
Week 6	Chapter 6; Poisson + Bootstrap (not in textbook) <b>First Midterm Exam</b>	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 Quiz or R project
Week 8	Chapter 7, Wilcoxon-Mann-Whitney Test <b>Fall Recess</b>	pp 281 – 306	HW
Week 9	Chapter 8, Paired Test Chapter 8, Paired non-parametric tests	pp 307 – 318 pp 325 – 337	HW Quiz or R project
Wk 10	Chapters 9, Goodness-of-fit Chapter 9, Chi-squared	pp 355 -365 pp 368 – 382	HW Quiz or R project
Wk 11	Chapter 10, Relationships Chapter 11, ANOVA	pp 383 – 401, 407 – 412 pp 442 – 454	HW Quiz or R project
Wk 12	Chapter 11, ANOVA <b>Second Midterm Exam</b>	pp 455 – 465, 478 – 487	HW Exam
Wk 13	Chapter 12, Correlation Chapter 12, Linear Model	pp 511 – 524 pp 525 – 560	HW Quiz or R project
Wk 14	Multivariate analysis (not in textbook) <b>Thanksgiving</b>		HW
Wk 15	Multivariate analysis (not in textbook) Multivariate analysis (not in textbook)		(no HW) Quiz or R project
<b>Final Exam: Tuesday, December 12, 8 – 10 am</b>			

## 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](http://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](http://policy.usc.edu/scientific-misconduct).

### Support Systems:

*Counseling and Mental Health - (213) 740-9355 – 24/7 on call*  
[studenthealth.usc.edu/counseling](http://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](http://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](http://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](http://equity.usc.edu), [titleix.usc.edu](http://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.symlicity.com/care\\_report](http://usc-advocate.symlicity.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](http://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](http://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](http://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](http://dps.usc.edu), [emergency.usc.edu](http://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](http://dps.usc.edu)

Non-emergency assistance or information.