



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

**Units:** 4

**Spring 2025 Semester**

**Lecture:** Tuesdays and Thursdays, 8:30am – 9:50am

**Location:** THH 212

**Discussion:** Mondays 3:00 – 3:50pm (RRI 321),  
or Tuesdays 2:00 – 2:50pm (RRI 301)

**Instructor:** Cosimo Arnesano

**Office:** BRI 4010

**Office Hours:** Tuesdays 3:40 – 4:30pm,  
Thursdays 3:40 – 4:30pm  
or by appointment

**Contact Info:** [arnesano@marshall.usc.edu](mailto:arnesano@marshall.usc.edu), 213-821-1599

For office hours, I will be in my office and meet in person.

**Teaching Assistant:**

Yue Huang (Will)

**Office Hours:** Mondays & Wednesdays, 2:00 – 3:00pm

**Location:** MCB lobby & Zoom

**Contact Info:** [yhuang42@usc.edu](mailto:yhuang42@usc.edu), 213-551-5723

## 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 six 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
<b>TOTAL</b>	<b>100</b>

## 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 1/14-1/16	Introduction and Chapter 1 Chapter 2, Description of Samples and Populations	pp 1 – 26 pp 27 – 59	(no HW)
Week 2 1/21-1/23	Chapter 2, Description of Samples and Populations Chapter 3, Probability and Binomial Distribution	pp 59 – 82 pp 83 – 93	HW 1
Week 3 1/28-1/30	Chapter 3, Probability and Binomial Distribution Finish Chapter 3 and short introduction to R	pp 94 – 102 pp 102 – 115	HW 2
Week 4 2/4-2/6	Chapter 4, Normal Distribution Chapter 5, Sampling Distribution	pp 122 – 140 pp 146 – 169	HW 3
Week 5 2/11-2/13	Chapter 6, Confidence Intervals Finish Chapter 6 plus lecture on R	pp 171 – 204 pp 205 – 208, 211 – 222	HW 4
Week 6 2/18-2/20	Chapter 7, Comparing Two Independent Samples Chapter 7, Comparing Two Independent Samples	pp 223 – 248 pp 249 – 275	HW 5 R proj 1
Week 7 2/25-2/27	Chapter 7, Wilcox-Mann-Whitney Test Bootstrap, Poisson, and more R	pp 281 – 306	HW 6
Week 8 3/4-3/6	Chapter 8: Paired tests <b>First Midterm Exam: Tuesday, March 4</b>	pp 307 – 318	HW 7 Exam
Week 9 3/11-3/13	Chapter 8, Paired non-parametric tests Chapter 9, Categorical Data	pp 325 – 337 pp 355 – 365, 368 – 382	HW 8 R proj 2
Week 10 3/18-3/20	SPRING RECESS SPRING RECESS		
Week 11 3/25-3/27	Chapter 10, Chi-Squared Test Chapter 10, Chi-Squared Test	pp 383 – 401 pp 407 – 412	HW 9 R proj 3
Week 12 4/1-4/3	Chapter 11, ANOVA Chapter 11, ANOVA	pp 442 – 454 pp 455 – 465, 478 – 487	HW 10 R proj 4
Week 13 4/8-4/10	Chapter 12, Correlation and Regression Chapter 12, Correlation and Regression	pp 511 – 524 pp 525 – 560	HW 11 R proj 5
Week 14 4/15-4/17	Statistics in the news and more R <b>Second Midterm Exam: Thursday, April 17</b>		Exam
Week 15 4/22-4/24	Multivariate analysis Multivariate analysis		HW 12
Week 16 4/29-5/1	Advanced topic: TBD Review		R proj 6
	<b>Final Exam: Wednesday, May 14, 8:00 – 10:00am</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.symplicity.com/care\\_report](http://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](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.