BISC 305: Statistics for the Biological Sciences

Lectures: T and Th, 11:00 AM – 12:20 PM
Discussion: M or W, 1:00 – 1:50 PM

Instructor: Peter Calabrese, petercal@usc.edu
Office hours:

Teaching Assistant:
Office hours:

Course Content

Statistics for the Biological Sciences is an introductory course in statistics addressed to students in the life sciences. 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. The course uses real data from life sciences. In addition, students will be introduced to R (a free computer program for statistical computing and graphics).

Textbook


Grading

There are two mid-term examinations (15% each), a quiz on some Thursdays (10%), and a final examination (35%). All examinations will occur as scheduled below: there will be no make-up examinations. Note particularly that university regulations strictly regulate the final examination date. In addition, there will be weekly homework assignments (15%) and two data analysis projects (5% each). It is important that students do the homework: I believe that students learn the most when working on the homework. A 50% grade deduction will be imposed for late homework, and no homework later than one week will be accepted.

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Wk. 4 09/14/21 Probability and the Binomial Distribution. Chapter 3, 102-115
09/16/21 The Normal Distribution. Chapter 4, 122-140

Wk. 5 09/21/21 Sampling Distribution. Chapter 5, 146-169
09/23/21 Confidence Intervals. Chapter 6, 171-204

Wk. 6 09/28/21 Confidence Intervals. Chapter 6, 205-208, 211-222
Poisson distribution and bootstrap (not in textbook)
09/30/21 First Midterm

Wk. 7 10/05/21 Comparing of Two Independent Samples. Chapter 7, 223-248
10/07/21 Comparing of Two Independent Samples. Chapter 7, 249-275

Wk. 8 10/12/21 The Wilcoxon-Mann-Whiney test, Chapter 7, 281-306
10/14/21 Fall recess (no class)

Wk. 9 10/19/21 Paired sample t-test and confidence interval, Chapter 8, 307-318
10/21/21 Paired sample non-parametric tests, Chapter 8, 325-337

Wk. 10 010/26/21 Interpretation, Chapter 8, 336-340
Categorical data, estimation of proportion, Chapter 9, 355-365
10/28/21 Categorical data, goodness-of-fit, Chapter 9, 368-382

Wk. 11 11/02/21 Categorical data, relationships, Chapter 10, 383-401, 407-412
11/04/21 Many Samples, ANOVA, Chapter 11, 442-454

Wk. 12 11/09/21 Many Samples, one and two-way ANOVA, Chapter 11, 455-465, 478-487
11/11/21 Second Midterm

Wk. 13 11/16/21 Regression, correlation, Chapter 12, 511-524
11/18/21 Regression, linear model, Chapter 12, 525-536

Wk. 14 11/23/21 Regression, linear model guidelines, Chapter 12, 537-560
11/25/21 Thanksgiving (no class)

Wk. 15 11/30/21 Multivariate analysis (not in textbook)
12/02/21 Review

Final Exam: Tuesday, December 14, 8 – 10 am
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.

Office of the Ombuds - (213) 821-9556 (UPC) / (323-442-0382 (HSC)
ombuds.usc.edu
A safe and confidential place to share your USC-related issues with a University Ombuds who will work with you to explore options or paths to manage your con