

STAT 205
Elementary Statistics for the Biological and Life Sciences
H01 - Fall 2017

Lectures: M W 8:05-9:20 AM in Leconte College 201
Instructor: Dr. Chao Cai
Email: caic@mailbox.sc.edu
Office Hours: By appointment
Prerequisites: MATH 111 or higher

Course Description: This course gives students in biology, chemistry, public health, pharmacy, nursing and other life sciences a non-calculus based introduction to the application of modern statistical methods including descriptive and inferential statistics. Statistics is a foundational research tool within the biological and life sciences. Topics include descriptive statistics, probability, and inference for statistical models including: one and two sample problems for continuous and discrete data, 2x2 tables (independence, comparing odds ratios, relative risks, and differences in proportions, diagnostic testing), one-way ANOVA, linear and logistic regression, and survival analysis.

Course Objectives: After completion of the course, the successful student will be able to (a) understand and interpret common graphical displays and summary statistics from data, (b) apply the rules of probability to solve basic problems, (c) understand aspects of one and two sample problems, including confidence intervals, hypothesis testing, sample size calculation, power, and checking assumptions, (d) understand basic ideas of one-way analysis of variance, (e) understand aspects of the simple linear regression model: least squares estimation, confidence interval and hypothesis tests for slope, (f) understand the logistic regression model and its use for analyzing binary outcomes with a continuous predictor, (g) understand aspects of 2x2 contingency tables: relative risk, odds ratio, difference in proportions, case-control studies, independence, sensitivity, specificity, and predictive values positive and negative, Simpson's paradox and the Cochran-Mantel-Haenszel test, (h) have a basic understanding of survival curves, and (i) be able to carry out common statistical methods in the computing package R.

Required textbook: Statistics for the Life Sciences, 5th Ed., by Samuels, M.L., Witmer, J.A., and Schaffner, A. Addison Wesley

Course website: Homework, grades, lecture notes will be posted in “**blackboard**”. (Use the link <https://blackboard.sc.edu> to login.)

Computing: Statistical analyses will be carried out via R, free software for statistical computing and graphics. If you have your own Windows-based machine or a Macintosh, you can install R from <http://cran.r-project.org/>. You will also need a scientific calculator for exams.

Grading:

- *Homework:* Homework assignments will be posted on the course website in blackboard with their due dates and will be collected at the beginning of the class on the due dates. **LATE HOMEWORKS WILL NOT BE ACCEPTED.**
- *Exams:* There will be four in-class exams, including the final. Each exam is worth 100 points. The highest three exams will be used to calculate your grade. **NO MAKE-UP EXAMS ARE GIVEN.**

Grade Components	Points
Assignments	6 assignments @ 50 = 300 points
Exams	3 exams @ 100 = 300 points
Total points	600 points

- You can compute your grade by dividing the # of points you earned by 600.

Grade Scales:

Percentage	Grades
90% - 100%	A
85% - 89%	B+
80% - 84%	B
75% - 79%	C+
70% - 74%	C
65% - 69%	D+
60% - 64%	D
Less than 60%	F

Attendance: I pick up the attendance sheet at the start of class. It is your responsibility to sign yourself in before that time. Three late arrivals will count as one absence. *Students who attend every class will receive 5% bonus added to their final grade.*

Cell Phone Use: Students must keep their **cell phones off** during lectures. If any student gets caught using a phone during a lecture he/she will be asked to leave the class and will be allowed to return only with the instructor's permission. Any cell phone use during an exam will be treated as cheating and will be subjected to disciplinary action according to university policies.

Tutoring: Free tutoring is available for STAT 205 students through USC student success center (SSC). Please contact the SSC directly <http://sc.edu/success/peertutoring.html>.

Tentative Course Outline:

No	Day	Date	Topic
1	M	8/28	Syllabus and policies; Introduction to R; Evidence; Random sampling
2	W	8/30	Variables, Frequency distributions
	M	9/4	<i>No Class – Labor Day</i>
3	W	9/6	Descriptive statistics; Measures of dispersion
4	M	9/11	Relationships b/w variables; Statistical Inference; Introduction to probability
5	W	9/13	Probability Rules; Density Curves and Random Variables
6	M	9/18	Binomial Distribution
7	W	9/20	Normal Distribution
8	M	9/25	Area under Normal Curve; Assessing Normality
9	W	9/27	Review
	M	10/2	EXAM 1
10	W	10/4	Sampling Distribution; Standard Error for Sample Mean (\bar{y}), CI for μ
11	M	10/9	Compare two means; CI for $(\mu_1 - \mu_2)$
12	W	10/11	Hypothesis Testing, t-test
13	M	10/16	More on hypothesis tests; Association and Causation
14	W	10/18	One-tailed t-test; Sample size and power; Wilcoxon-Mann-Whitney Test
15	M	10/23	Paired design, Sign test, CI for population p, Goodness of fit test
16	W	10/25	Review
	M	10/30	EXAM 2
17	W	11/1	2x2 tables, Chi-square test, Fisher Exact Test, r x k contingency table
18	M	11/6	CI on $p_1 - p_2$, Odds ratio, relative risk, case control study
19	W	11/8	Stratified 2x2 tables; Cochran Mantel Haenszel, Simpson's Paradox
20	M	11/13	ANOVA
21	W	11/15	Linear Regression
22	M	11/20	Logistic Regression
	W	11/22	<i>No Class – Thanksgiving</i>
23	M	11/27	Review
	W	11/29	EXAM 3
24	M	12/4	Survival Analysis
25	W	12/6	Review
	M	12/11 @ 9:00am	Final Exam