Description: Elementary Statistics for the Biological and Life Sciences. (3) (Prereq: MATH 111 or higher, or consent of department) An introduction to fundamental statistical methods with applications in the biological and life sciences. Topics include descriptive statistics, probability, inference, and an overview of contingency tables, linear regression, and ANOVA.

Purpose of the Course: To give students in biology, ecology, 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. To show students that statistics is an important research tool within the biological and life sciences.


Attendance: All students are expected to attend all classes. It is assumed that any information given out during class has been delivered to all students.

Calculator and Computer: Each student will need a scientific calculator and access to the internet to complete homework assignments and print off notes and readings. Computers are located throughout the campus. I’ll teach certain statistical methods on the TI-83 (or higher – 84 is preferred) calculator. You will be allowed to use this calculator during exams and many students find this helpful, since having one of these calculators can cut down significantly on hand calculations. If you do not have one of these calculators or cannot afford one, the department has a very few loaner TI-84 calculators.

Cell Phones: Keep them out of sight and turned off. Absolutely no cell phones during exams.

What is Expected of You: Read the sections of the text to be covered prior to the class session.
Attend class regularly.
Arrive on time.
Bring lecture notes with you.
Attempt to do all assigned homework.
Ask questions when you don’t understand!
Learning Outcomes: Upon completion of this course, the student will be able to

- Be comfortable with data sets commonly found in the biological and life sciences
- Describe a data set
  - Graphically – create an accurate and clear graphical display of a data set
  - Numerically – calculate and report a meaningful numeric summary of a data set
- Compute probability
  - Describe and apply basic rules of probability
  - Understand sensitivity and specificity
  - Compute probabilities under the binomial, normal, $t$, and Chi-square distributions
- Assess normality using a normal probability plot (QQplot)
- State and apply the Central Limit Theorem
- Carry out, understand, and report findings for a hypothesis test:
  - The population mean and difference between two population means based on $t$-distribution (and also compute and interpret confidence interval)
  - Wilcoxon-Mann-Whitney and Sign tests
  - Pearson’s $\chi^2$ for Goodness of Fit and 2-way contingency tables
- Define Type I Error, Type II Error, and Power and describe how they relate to a hypothesis test
- State and assess criterion for validity of the hypothesis test
- Compute and interpret sample correlation coefficient and $r^2$
  - Compute and interpret confidence interval for population correlation coefficient using Fisher Z-transform
- Carry out, understand, and report findings for Simple Linear Regression including:
  - State the statistical model
  - Conduct regression analysis and interpret results
  - Compute confidence interval / hypothesis test and interpret results for slope of the regression line
  - State and assess criterion for validity of regression analysis
Homework: A total of 9 homework assignments covering the concepts taught in the class will be posted in the “Homework” section of the class website. Homework will not be graded. *I would suggest trying the homework yourself before discussing with others.* Attempting to do problems yourself will reveal if you really know the material. If you would like feedback on your work, you may submit it to me. I will tell you what is correct or incorrect and give you feedback. Please only submit work that needs feedback – do not submit answers copied from the solution key or someone else’s solution. Please submit this work in a neat, clearly labeled format.

**Quizzes:** There will be 12 quizzes given throughout the semester. Dates are listed on the List of Topics sheet. There will be no make-up quizzes. Each quiz will consist of one question from recently assigned homework. Each quiz is worth 10 points and your lowest quiz score will be dropped. Your second lowest quiz score will count as possible bonus points (more on this as the semester progresses).

Exams: Two in-class exams will be given. Dates are listed on the List of Topics sheet. All work on exams must be independent. Make-up exams will be considered only in extreme circumstances and a doctor’s note will be required. Contact me as soon as possible if you think your situation merits a makeup.

Final Exam: The final exam for this course will be comprehensive and will be administered:
Friday, May 1 at 2:00pm for the MWF 9:05-9:55 class
Wednesday, May 6 at 9:00am for the MWF 11:15-12:05 class

All work on the final exam must be independent.

**Possible Grade Contributions:**

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<tr>
<td>First Exam 100 pts.</td>
<td>A 360-400</td>
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<tr>
<td>Second Exam 100 pts.</td>
<td>B+ 352-359</td>
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<tr>
<td>Quiz Average 100 pts.</td>
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<td>Final Exam 100 pts.</td>
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Honor Code: See the *Carolinian Creed* in the *Carolina Community: Student Handbook & Policy Guide*.

**Computer Facilities:** A computer account through the College of Arts and Sciences using the MATH/STAT (MS) domain will be set up for you. Two MS labs are available in LeConte, rooms 124 and 303A. Check these locations for hours. Through this account, you will be issued a reasonable amount of paper for printing at no charge.

Class e-mails: Please make sure your e-mail address is current in the Blackboard system. I will be sending all class e-mails through blackboard.