Elementary Statistics for the Biological and Life Sciences
Spring 2011
Tuesday/Thursday 3:30–4:45 in Sloan College 112

• Instructor: Dr. Tim Hanson
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  Office hours: Monday & Wednesday 1:30-2:30, Tuesday 1:00-2:00

• Description: 3 credits; prerequisite is Math 111 or higher. This course gives 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. 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, $2 \times 2$ tables (odds ratio, relative risk, differences in proportions, diagnostic testing), and linear regression.

• Learning 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, including conditional probability and Bayes’ rule, to solve basic problems, (c) understand these aspects of one and two sample problems: confidence intervals, hypothesis testing, sample size calculation, power, and checking assumptions, (d) understand these aspects of the simple linear regression model: least squares estimation, the normal-errors model, confidence interval and hypothesis tests for slope, (e) understand these aspects of 2 by 2 contingency tables: relative risk, odds ratio, difference in proportions, case-control studies, independence, sensitivity, specificity, and prevalence, predictive values positive and negative, and (f) have basic understanding of related ideas including receiver operator characteristic (ROC) curves, logistic regression, disease rates, incidence versus prevalence, survival curves and hazard regression.

• Required textbook: Samuels, M.L., and Witmer, J.A. (2003). *Statistics for the Life Sciences*, 3rd Ed. We will cover chapters 2, 3, 4, 5, 6, 7, 12, and 10 as well as some other material.
My expectations for you: Read the sections of the text to be covered prior to the class session. Attend class regularly and arrive on time. Bring lecture notes with you. Do assigned homework after every lecture. Ask questions to clarify concepts.

Computing: Statistical methodology will be carried out by hand & calculator using methods taught in class and tables from the textbook, and also using free statistical software for PC and Mac (primarily be in R and some online applets). You will also need a scientific calculator for exams.

Homework/quizzes: Homework assignments with solutions will be posted on the course website after each text section is covered; these homeworks will not be graded. I cannot overstress how important these assignments are to learning the material. In-class quizzes based on the homework will be given approximately every week; quiz dates will be announced in class and posted on the website.

Exams: Two in-class exams will be given. Make-up exams will be considered only in extreme circumstances and documentation is required. Contact me ahead of time if you think your situation merits a makeup. The final exam takes place Thursday, April 28 at 9:00 a.m. in Sloan College 112.

Grading: Each of the three exams is worth 20%, your quizzes are worth 40%. Grades: 90%-100% A, 85%-89% B+, 80%-84% B, 75%-79% C+, 70%-74% C, 65%-69% D+, 60%-64% D, under 60% F.