BIOM 520: Concepts and Methods in Biostatistics

Prerequisites

This course is designed for those with no previous course in statistics or biostatistics (i.e. a course whose content focused on statistical concepts and statistical methods with or without an emphasis on data analysis).

Objectives

1. Develop skills with biostatistical concepts and methods to (a) better understand basic statistical concepts, (b) describe relevant features of data from an experiment including variability using standard errors and confidence intervals, (c) compare two or more groups when observing continuous or binary outcomes, (d) evaluate the correlation between two variables and evaluate whether their relationship can be described by a linear regression, and (e) analyze experiments that take pre- and post-measurements to evaluate an experimental factor.
2. Develop skills with a statistical software package (SAS) to (a) import data into a database and characterize data structures, (b) define structured elements for defining statistical analyses, and (c) interpret output from selected statistical procedures.
3. Develop communication skills for summarizing data and presenting statistical analyses.

Topics Covered

1. Concepts: Measurement error, normal distribution, parameter estimates, confidence intervals, hypothesis testing, multiple comparisons and hypothesis testing, sample size determination, power.
2. Graphical methods: histogram, cumulative distributions, bar charts, pie charts, box plots, dot plots, scatter plots.
3. Statistical methods: standard error and confidence intervals for means/proportions, comparison of two or more groups (t-tests and ANOVA), correlation analysis, comparison of proportions among groups, association between binary variables, linear regression, repeated measurements, sample size determination, power calculations.

Course Requirements

1. Attend all lectures, computer labs and presentation sessions
2. Complete all computer lab exercises
3. Complete a project that is an independent analysis project using a class data set
4. Do a short presentation on the statistical analysis done for the project in class
5. Complete all class readings and exercises.