

BIOL-UA 42 Biostatistics

Instructors:

Mary Killilea
Katie Schneider
Brian Parker

Course Description:

The ability to organize and analyze biological data is an essential research tool. This course provides an introduction to the methods used to analyze biological data. The course will introduce topics such as describing and displaying data, probability, hypothesis testing, how to design experiments, and many others. Hands on experience will be provided through weekly exercises using biological data and *R*, a free open source statistical software.

Pre-requisites:

Principles of Biology I (BIOL-UA 11)
Principles of Biology II (BIOL-UA 12)

Textbook and Required Materials:

The Analysis of Biological Data. 2nd Edition. Whitlock, MC and D. Schluter 2015 Roberts and Company Publishers
The R Book. John Wiley and Sons, West Sussex, England. Crawley, M.J 2007
Introductory Statistics with R. 2nd Edition. Springer, Dalgard, P 2008

Grading:

3 Exams	60%
Weekly homework assignments	30%
Recitation attendance	5%
Class participation	5%

Topics:

Course introduction, statistics and samples; displaying data
Describing data, estimating with uncertainty
Probability, hypothesis testing
Analyzing proportions; fitting probability models to frequency data
Contingency analysis; normal distribution
Normal distribution and inference for a normal population
Comparing two means, handling violations of assumptions
Comparing means of more than two groups (ANOVA); designing experiments
Correlation and regression
Multiple explanatory variables
Multiple explanatory variable
Meta-analysis
Statistics in the literature