

## About the Book

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Welcome to the third edition of the *Handbook of Biological Statistics*! This online textbook evolved from a set of notes for my Biological Data Analysis class at the University of Delaware. My main goal in that class is to teach biology students how to choose the appropriate statistical test for a particular experiment, then apply that test and interpret the results. In my class and in this textbook, I spend relatively little time on the mathematical basis of the tests; for most biologists, statistics is just a useful tool, like a microscope, and knowing the detailed mathematical basis of a statistical test is as unimportant to most biologists as knowing which kinds of glass were used to make a microscope lens. Biologists in very statistics-intensive fields, such as ecology, epidemiology, and systematics, may find this handbook to be a bit superficial for their needs, just as a biologist using the latest techniques in 4 –  $D$ , 3-photon confocal microscopy needs to know more about their microscope than someone who's just counting the hairs on a fly's back. But I hope that biologists in many fields will find this to be a useful introduction to statistics.

I have provided a spreadsheet to perform many of the statistical tests. Each comes with sample data already entered; just download the spreadsheet, replace the sample data with your data, and you'll have your answer. The spreadsheets were written for Excel, but they should also work using the free program Calc, part of the OpenOffice.org suite of programs. If you're using OpenOffice.org, some of the graphs may need re-formatting, and you may need to re-set the number of decimal places for some numbers. Let me know if you have a problem using one of the spreadsheets, and I'll try to fix it.

I've also linked to a web page for each test wherever possible. I found most of these web pages using John Pezzullo's excellent list of Interactive Statistical Calculation Pages, which is a good place to look for information about tests that are not discussed in this handbook.

There are instructions for performing each statistical test in SAS, as well. It's not as easy to use as the spreadsheets or web pages, but if you're going to be doing a lot of advanced statistics, you're going to have to learn SAS or a similar program sooner or later. I've got a page on the basics of SAS.

Salvatore Mangiafico has written An R Companion to the Handbook of Biological Statistics, available as a free set of web pages and also as a free pdf. *R* is a free statistical programming language, useable on Windows, Mac, or Linux computers, that is becoming increasingly popular among serious users of statistics. If I were starting from scratch, I'd learn *R* instead of SAS and make my students learn it, too. Dr. Mangiafico's book provides example programs for nearly all of the statistical tests I describe in the Handbook, plus useful notes on getting started in *R*.