



Foundational and Applied Statistics for Biologists Using R

By Ken A. Aho

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Full of biological applications, exercises, and interactive graphical examples, *Foundational and Applied Statistics for Biologists Using R* presents comprehensive coverage of both modern analytical methods and statistical foundations. The author harnesses the inherent properties of the R environment to enable students to examine the code of complicated procedures step by step and thus better understand the process of obtaining analysis results. The graphical capabilities of R are used to provide interactive demonstrations of simple to complex statistical concepts. Assuming only familiarity with algebra and general calculus, the text offers a flexible structure for both introductory and graduate-level biostatistics courses. The first seven chapters address fundamental topics in statistics, such as the philosophy of science, probability, estimation, hypothesis testing, sampling, and experimental design. The remaining four chapters focus on applications involving correlation, regression, ANOVA, and tabular analyses. Unlike classic biometric texts, this book provides students with an understanding of the underlying statistics involved in the analysis of biological applications. In particular, it shows how a solid statistical foundation leads to the correct application of procedures, a clear understanding of analyses, and valid inferences concerning biological phenomena. An R package (*asbio*) developed by the author is available from CRAN . Accessible to those without prior command-line interface experience, this companion library contains hundreds of functions for statistical pedagogy and biological research. The author's website also includes an overview of R for novices.

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Editorial Review

Review

[Reviewed by Michael Sutherland, *MAA Reviews*, Mathematical Association of America, 9/30/2014]

This is a terrific intermediate level modern applied statistics text for biologists... or anyone else who is interested in data analysis. It is a big, handsome book of 600 plus pages. That might seem annoyingly large, but it sure does make it easy to do a thorough job of introducing and detailing the main concepts, the methods, and the pleasures of modern data analysis. It is a visually pleasing book with good layouts, nice typefaces and great tables and graphics... and the R code to produce them! A great way for a class to really engage with R graphics.

The Table of Contents shows 7 foundational chapters followed by 4 applications chapters. The first chapter on philosophical and historical foundations of science and "knowing" is novel, well done and too brief! But I deeply appreciated its presence, its importance for students and the opportunity it provides for making connections between fields. The remaining 6 foundational chapters present the traditional set of concepts: probability, density functions, their parameters and statistics, interval estimation (by sampling, resampling and simulation), hypothesis testing, sampling design and experimental design. The following application chapters are the classic core of statistical models: regression, ANOVA, and contingency counts.

For the complete review go to toma.org/publications/maa-reviews/foundational-and-applied-statistics-for-biologists-using-r

From the Author

Biologists frequently misuse statistics because they fail to understand the foundations on which they are based. The comprehension of foundations leads directly to a deeper appreciation of both the mechanisms and purpose of statistics.

The text encourages students to construct their own sense of what is being learned through the interactive graphical capabilities of R. Statistical software often exacerbate problems in student comprehension by providing answers without requiring any level of understanding. The open environment of R, however, reveals processes other software lock away in black boxes.

The book errata, a link to the electronic appendix to the book, "Introduction to R", book code, and other helpful materials can be found at the book's website:
www2.cose.isu.edu/~ahoken/book/

Users Review

From reader reviews:

Amy Dixon:

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Paige Robinson:

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