

PREFACE

The 11th edition of *Biostatistics: A Foundation for the Analysis in the Health Sciences* was prepared to meet the needs of students who may be using the book as a text in a course, and for professionals who may need a handy desk reference for basic, but widely used, statistical procedures in their applied work. For undergraduates, several chapters in this edition introduce concepts to students who are taking a first, generally junior-level or senior-level, course in statistics as part of their pre professional, nursing, or public health education. For beginning graduate students, both introductory chapters and more advanced topics in the text are suitable for master's students in health professions.

The breadth of coverage in the text is much more than may be generally covered in a one-semester course. This coverage, along with hundreds of practical and specific subject-matter exercises, allows instructors extensive flexibility in designing a course at various levels. We have developed some ideas on appropriate topical coverage based on our own use of this text in the classroom, and we present a matrix below in that regard.

As with previous editions of this book, the 11th edition requires little mathematical knowledge beyond college algebra. However, as many instructors will attest, it is not uncommon for students to lack solid proficiency in algebra prior to taking a statistics course. Our experience suggests that spending some time showing basic, algebraic manipulations of the formulas in the book goes a long way in quelling fears with mathematics that may easily undermine a statistics course. We have attempted to maintain an emphasis on practical and intuitive understanding of principles rather than on abstract concepts, and we therefore maintain a reliance on problem-solving utilizing examples and practice problems that are drawn largely from the health sciences literature instead of contrived problems, which makes the text more practical and less abstract. We believe that this makes the text more interesting for students, and more useful for health professionals who reference the text while performing their work duties.

There is no doubt that technological sophistication has changed how we teach and how we apply statistics professionally. The use of hand calculations can be a useful way to develop an understanding of how formulas work, and they also lead to an appreciation of underlying assumptions that need to be considered. However, once basic skills are learned, it is often useful to explore computer programs for dealing with large and/or real-world problem sets. Additionally, the reliance on statistical tables, once necessary for finding areas under curves, estimates of probability, and so on, has largely been replaced by efficient computer algorithms readily available to students and practitioners. To that end, you will find example outputs from MINITAB, SAS, SPSS, R, JASP, EXCEL, and others in the text. We do not endorse the use of any particular program, but simply note that many are available and both students and professionals will need to have some facility using the program of their choice. Additionally, we generally only provide outputs and explanation regarding programs, not instruction on their use, as there are many books dedicated to providing stepwise user guides for various programs.

Changes and Updates to This Edition

Many changes and updates have been made to this edition. We have attempted to incorporate corrections and clarifications that enhance the material presented in hopes of making the text

more readable and accessible to the audience. We thank the reviewers of the many editions of this text for making useful comments and suggestions that have found their way into the new edition. Of course, there are always ways to improve and enhance, and we welcome comments and suggestions.

Specific changes to this edition include: (1) a newly rewritten introduction to the scientific method in Chapter 1; (2) a rearranged and rewritten Chapter 2 that now includes a section on data visualization and graphing; (3) an introduction to hypothesis testing and controversies surrounding p values in Chapter 7; (4) a brief introduction to Poisson regression in Chapter 11; (5) testing of dependent proportions using McNemar's Test in Chapter 12; and (6) the use of randomization procedures, including permutation-based p values and bootstrap confidence intervals, has been integrated throughout the text.

Other changes have occurred as well. Numerous changes to writing and phrasing have occurred to enhance clarity throughout the text. Also, by popular demand, we have integrated some R scripting ideas throughout many chapters for those using that particular software. Finally, for the benefit of instructors, we have provided some "Instructor-only" problems that will be made available to adopters of the text to use in their courses. Finally, the statistical tables are readily available through your instructor. Inasmuch as some professionals and professors still use tables, we believe it is important to retain access to them, and we continue to provide examples of their use in the current edition; however, we also show alternatives to tabled probabilities using computer programs.

Coverage Ideas

In the table below, we provide some suggestions for topical coverage in a variety of contexts, with "X" indicating those chapters we believe are most relevant for a variety of courses for which we believe this text is appropriate. As mentioned above, the text is designed to be flexible in order to accommodate various teaching styles and course presentations. Although the text is designed with progressive presentation of concepts in mind, certain topics may be skipped or briefly reviewed so that instructors may focus on concepts most useful for their courses.

	Chapters (X: Suggested coverage; O: Optional coverage)														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Undergraduate course for health sciences students	X	X	X	X	X	X	X	X	X	O	O	X	O	O	O
Graduate course for beginning health sciences master's students	X	X	X	X	X	X	X	X	X	X	O	X	X	X	O
Graduate course for graduate health sciences students who have completed an introductory statistics course	X	O	O	O	O	X	X	X	X	X	X	X	X	X	X

Supplements

Several supplements are available for the text on the instructor's website at www.wiley.com/go/Daniel/Biostatistics11e. These include:

- *Instructor's Solution Manual*, available only to instructors who have adopted the text.

- **Data Sets**, over 200 data sets are available to be downloaded in CSV format for ready importing into any basic statistics program.

Acknowledgments

Many reviewers, students, and faculty have made contributions to this text through their careful review, inquisitive questions, and professional discussion of topics. In particular, we would like to thank:

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We wish to acknowledge the cooperation of Minitab, Inc. for making available to the authors over many years and editions of the book the latest versions of their software.

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book. Additionally, Dr. James T. Wassell provided useful assistance with some of the survival analysis methods presented in earlier editions of the text.

We are grateful to the many researchers in the health sciences field who publish their results and hence make available data that provide valuable practice to the students of biostatistics.

Final Note

I am eternally grateful that I have had the opportunity to work with Dr. Wayne Daniel on several editions of this text. I was invited by Wayne to work with him in various capacities beginning with the 8th edition. Since that time, I have had the pleasure to get to know Wayne and to appreciate his high standards and expectations. Unfortunately, Wayne was not able to participate in this edition. I am honored that he has entrusted me to carry forward his legacy.

CHAD L. CROSS
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Coverage

The text is designed to provide a comprehensive coverage of the topics in biostatistics. The text is divided into two main parts: the first part covers the basic concepts and methods, and the second part covers the more advanced topics. The text is written in a clear and concise style, and it includes many examples and exercises to help students understand the material. The text is also designed to be flexible, so that it can be used in a variety of ways. For example, it can be used as a textbook for a course in biostatistics, or it can be used as a reference for researchers in the field.

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