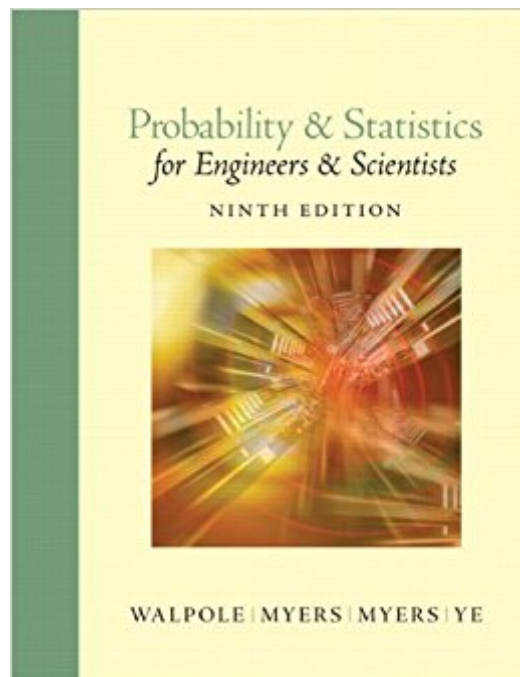




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# **Probability And Statistics For Engineers And Scientists (9th Edition)**



## Synopsis

This classic text provides a rigorous introduction to basic probability theory and statistical inference, with a unique balance of theory and methodology. Interesting, relevant applications use real data from actual studies, showing how the concepts and methods can be used to solve problems in the field. This revision focuses on improved clarity and deeper understanding.

## Book Information

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## Customer Reviews

This classic book provides a rigorous introduction to basic probability theory and statistical inference that is motivated by interesting, relevant applications. It assumes readers have a background in calculus, and offers a unique balance of theory and methodology. Chapter topics cover an introduction to statistics and data analysis, probability, random variables and probability distributions, mathematical expectation, some discrete probability distributions, some continuous probability distributions, functions of random variables, fundamental sampling distributions and data descriptions, one- and two-sample estimation problems, one- and two-sample tests of hypotheses, simple linear regression and correlation, multiple linear regression and certain nonlinear regression models, one factor experiments: general, factorial experiments (two or more factors), 2k factorial experiments and fractions, nonparametric statistics, and statistical quality control. For individuals trying to apply statistical concepts to real-life, and analyze and interpret data. --This text refers to an out of print or unavailable edition of this title.

**Goals, Approach and Mathematical Level** The seventh edition emphasizes and illustrates the use

of probabilistic models and statistical methodology that is employed in countless applications in all areas of science and engineering. There remains an important balance between theory and methodology that is featured in the text. We do not avoid the use of some theory but our goal is to let the mathematics provide insight rather than be a distraction. We feel that engineers and scientists are trained in mathematics and thus the providing of mathematical support when needed keeps the pedagogy from becoming a series of illustrated recipes in which the concepts are not understood and could never be applied or extended by the student except within very narrow bounds. The text contains an abundance of exercises in which the methodology discussed is illustrated by the use of real-life scientific scenarios and data sets. The complete set of data files which accompany the text are available for download from the text companion website, located at <http://www.prenhall.com/walpole>. Though we attempt to appeal to engineers, the exercises are not confined to engineering applications. The student is exposed to problems encountered in many sciences including social sciences and biomedical applications. The motivation here stems from the fact that trained engineers are more and more becoming exposed to nontraditional settings, including areas like bioinformatics and bioengineering. While we do let calculus play an important role but it should be noted that its use is confined to elementary probability theory and properties of probability distributions (Chapters 3, 4, 6, and 7). In addition, a modest amount of matrix algebra is used to support the linear regression material in Chapters 11 and 12. This is despite the fact that an "optional" section appears in Chapter 11 that includes the development of the multiple linear regression model with more substantive use of matrices. The student who uses this text should have completed one semester or two quarters of differential and integral calculus. An exposure to matrix algebra would be helpful but not necessary if the course content excludes the aforementioned optional section.

**Content and Course Planning** The text is designed for either a one or two semester course. A reasonable curriculum for a one semester course might include Chapters 1 through 10. One may even choose to teach an early portion of Chapter 11 in order to introduce the student to the concept of simple linear regression. Chapter 1 is an overview of statistical inference, sampling and data analysis. Indeed, some very rudimentary aspects of experimental design are included, along with an appreciation of graphics and certain vital characteristics of data collection. Chapters 2, 3, and 4 deal with basic probability and discrete and continuous random variables. Chapters 5 and 6 cover specific discrete and continuous distributions with illustrations of their use and relationships among them. Chapter 7 deals with transformations of random variables. This chapter is listed as "optional" and would only be covered in a more theoretical course. This chapter is clearly the most mathematical chapter in the text. Chapter 8

includes additional material on graphical methods as well as an introduction to the notion of a sampling distribution. The  $t$  and  $F$  distributions are introduced along with motivation regarding their use in chapters that follow. Chapters 9 and 10 contain material on one and two sample point and interval estimation and hypothesis testing. The flexibility in a single semester course lies in the option of exclusion of Chapter 7 as well as teaching only a subset of the several specific discrete and continuous distributions discussed and illustrated in Chapters 5 and 6. There is additional flexibility involved in dealing with Chapter 9 where maximum likelihood and Bayes estimation are covered in detail. An instructor may decide to give only a cursory development of one or both of these topics. In addition, estimation in Chapter 9 includes new material on prediction intervals and tolerance intervals along with a thorough discussion on the distinction among them, with examples. Flexibility may be exercised here. Chapters 11-17 contain ample material for a second semester of a two-semester course. Chapters 11 and 12 cover simple and multiple linear regression respectively. However, Chapter 12 contains new material that deals with special nonlinear models involved when one deals with nonnormal responses. As a result, logistic and Poisson regression are treated along with important practical illustrations. This in addition to new material in categorical variable regression again provides considerable flexibility for the instructor in his or her treatment of regression. The treatment of regression in this text is extensive and many special regression topics in Chapter 12 are self-contained. Chapters 13 through 17 contain topics in analysis of variance, design of experiments, nonparametric statistics, and quality control.

**Case Studies and Computer Software** As in previous editions there are many case studies that demonstrate statistical analysis of interesting real-life data sets. In most cases graphical techniques are used. These case studies are featured in two sample hypothesis testing, multiple linear regression, analysis of variance, and the analysis of 2-level experimental designs. Where appropriate, the use of residual plots, quantile plots, and normal probability plots are described in the analysis. Computer output is used for illustration purposes for these case studies and for other examples in the text. In that regard both SAS and MINITAB are featured. We have always felt that the experience of reading computer printout is invaluable to the student even if the package or packages featured in the text are not what is used by the instructor. Exposure to more than one type of software can broaden the experience base for the student. There is certainly no reason to believe that the software in the course is that which he or she will be called upon to use in practice.

**New To This Edition** Chapter 1 has been revised and expanded. Even more emphasis has been placed on the concept of variability. Much of the material on graphical methods in other chapters was moved (where appropriate) to Chapter 1 and is now allowed to flow as illustrative technology with the material on

descriptive statistics. We have placed more emphasis in Chapter 1 on a discussion of the necessary role of probability in the "bottom line" provided by data analysis tools. Though much of Chapter 1 is overview, we prepare the student via examples with the notion of a P-value which will be so important in later chapters. In addition, more exercises are added in this chapter to cover the new or transferred material. More and better examples are given in nearly all chapters. This is a new effort to illustrate with better scientific applications. Chapter 9 contains new material on Bayesian statistics with additional examples. A section on prediction intervals is given as indicated earlier. Great pains are taken to distinguish among confidence intervals, tolerance intervals, and now, prediction intervals. We find that many students (and practitioners) struggle with these concepts. Though P-values were introduced several editions earlier, more and better discussion of their interpretation is given early in Chapter 10 on hypothesis testing. Major changes appear in Chapters 11 and 12 on regression analysis. Simple linear regression contains a more thorough discussion of the meaning of the model as well as the concept of least squares estimation. These explanations, replete with improved graphics, give the reader a clearer understanding of what regression is all about. Also new and better examples and exercises are given. The discussion of data transformation is also enhanced. Chapter 12 contains two major new topics. One of them is the use of categorical or indicator variables. The other is the introduction of two important nonlinear models for nonnormal responses—logistic regression and Poisson regression. These are accompanied by an explanatory account of how frequently nonnormal responses are encountered in practice. These developments are not overly mathematical but rather highlight examples of their use. Industrial, biological, and biomedical examples are discussed. Chapters 11, 12, and 13 have been "trimmed" to a certain extent by the elimination of certain computational drudgery that has no current pedagogic merit. For example, the development of the normal equations in multiple regression is outlined without the concern for certain laborious computations that are handled by computer software. In addition, in Chapters 13 and 14 the use of so-called computational formulae involving treatment and grand totals, results that bring very little in the way of concept understanding, have been removed. This allows for a more streamlined discussion of ANOVA. New and better ANOVA examples are included. New and better examples are given in Chapter 15 on two level factorial and fractional factorial experiments. Some of these deal with the very important and timely use of semiconductor manufacturing. We have made use of much additional highlighting of important material through the use of "boxing in" important results and the use of subsections. We feel that continual page after page of dry text is unattractive, and these reminders of transition to a different or new concept makes for easier learning. Available Supplements Student Solutions Manual (0-13-041537-5)

Contains carefully-worked solutions to all odd-numbered exercises. Instructor's Solutions Manual (0-13-041536-7) Contains carefully-worked solutions to all exercises. Companion Website: Available free to all adopters, the companion website can be fo... --This text refers to an out of print or unavailable edition of this title.

Using this book was a good replacement for my actual stats professor. Very easy to follow and the applied problems for engineering are easy to follow. Cons: I know it's a used book, but me and another class mate of mine had issues with the binding coming loose. The table section at the end of my book is no longer attached (which was convenient for the class ironically). If you can get your hands on a well-cared for version then this would be a solid stats book for Chem E.

-Content was average.-It really didn't get me interested in statistics with the examples and homework problems.-Would have liked a real strong focus on the engineering side. I guess I can't say don't get this book if it is required for a class. Just know that if you do purchase it the actual quality of the book is terrible. What I mean by it is the binding is cheap and the paper quality is awful. Expect become loose in the binding throughout its use. My three (3) stars mainly came from the cheap glue and paper they used to put the book together and is not meant to judge the quality of content because I really was just trying to get through the class. For quality of material read the other reviews provided.

In my opinion this is a great textbook. It's not exciting, but you aren't left having to google much if you actually carefully read from cover to cover.

Good gracious, I think this textbook is lacking in many areas. I found the text unreasonably time consuming to read, and the examples inadequate to explain how to solve problems. If you have to use this book, get the solutions manual to accompany it, especially if you have an unavailable professor.

I studied engineering. I always like to have this book with me as a book I use for some engineering work.

Great book and great price. The book was excellent.

This book was filled with information; some of it was useful; pieces of it were obscure; the majority of it was helpful. This book was my trusty companion for about three and a half months. We went everywhere together - the third floor of the big library, the basement of my favorite library, classes, computer labs, even a trip or two to the coffee shop. We had a good time together. The book was just small enough to not break my back as I lugged it about campus, but just big enough to begin to stir that slight resentment as finals week rolled around.

great book

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