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KEY=TEXTS - CARLO CHURCH

Practical Statistics for Medical Research *CRC Press* Most medical researchers, whether clinical or non-clinical, receive some background in statistics as undergraduates. However, it is most often brief, a long time ago, and largely forgotten by the time it is needed. Furthermore, many introductory texts fall short of adequately explaining the underlying concepts of statistics, and often are divorced from the reality of conducting and assessing medical research. Practical Statistics for Medical Research is a problem-based text for medical researchers, medical students, and others in the medical arena who need to use statistics but have no specialized mathematics background. The author draws on twenty years of experience as a consulting medical statistician to provide clear explanations to key statistical concepts, with a firm emphasis on practical aspects of designing and analyzing medical research. The text gives special attention to the presentation and interpretation of results and the many real problems that arise in medical research. The BUGS Book **A Practical Introduction to Bayesian Analysis** *CRC Press* Bayesian statistical methods have become widely used for data analysis and modelling in recent years, and the BUGS software has become the most popular software for Bayesian analysis worldwide. Authored by the team that originally developed this software, The BUGS Book provides a practical introduction to this program and its use. The text presents complete coverage of all the functionalities of BUGS, including prediction, missing data, model criticism, and prior sensitivity. It also features a large number of worked examples and a wide range of applications from various disciplines. The book introduces regression models, techniques for criticism and comparison, and a wide range of modelling issues before going into the vital area of hierarchical models, one of the most common applications of Bayesian methods. It deals with essentials of modelling without getting bogged down in complexity. The book emphasises model criticism, model comparison, sensitivity analysis to alternative priors, and thoughtful choice of prior distributions—all those aspects of the "art" of modelling that are easily overlooked in more theoretical expositions. More pragmatic than ideological, the authors systematically work through the large range of "tricks" that reveal the real power of the BUGS software, for example, dealing with missing data, censoring, grouped data, prediction, ranking, parameter constraints, and so on. Many of the examples are biostatistical, but they do not require domain knowledge and are generalisable to a wide range of other application areas. Full code and data for examples, exercises, and some solutions can be found on the book's website. **Linear Models with R** *CRC Press* A Hands-On Way to Learning Data Analysis Part of the core of statistics, linear models are used to make predictions and explain the relationship between the response and the predictors. Understanding linear models is crucial to a broader competence in the practice of statistics. **Linear Models with R, Second Edition** explains how to use linear models **Introduction to Modeling and Analysis of Stochastic Systems** *Springer* This book provides a self-contained review of all the relevant topics in probability theory. A software package called MAXIM, which runs on MATLAB, is made available for downloading. Vidyadhar G. Kulkarni is Professor of Operations Research at the University of North Carolina at Chapel Hill. **Applied Categorical and Count Data Analysis** *CRC Press* Developed from the authors' graduate-level biostatistics course, Applied Categorical and Count Data Analysis explains how to perform the statistical analysis of discrete data, including categorical and count outcomes. The authors describe the basic ideas underlying each concept, model, and approach to give readers a good grasp of the fundamentals of the methodology without using rigorous mathematical arguments. The text covers classic concepts and popular topics, such as contingency tables, logistic models, and Poisson regression models, along with modern areas that include models for zero-modified count outcomes, parametric and semiparametric longitudinal data analysis, reliability analysis, and methods for dealing with missing values. R, SAS, SPSS, and Stata programming codes are provided for all the examples, enabling readers to immediately experiment with the data in the examples and even adapt or extend the codes to fit data from their own studies. Designed for a one-semester course for graduate and senior undergraduate students in biostatistics, this self-contained text is also suitable as a self-learning guide for biomedical and psychosocial researchers. It will help readers analyze data with discrete variables in a wide range of biomedical and psychosocial research fields. **Bayesian Data Analysis, Third Edition** *CRC Press* Now in its third edition, this classic book is widely considered the leading text on Bayesian methods, lauded for its accessible, practical approach to analyzing data and solving research problems. Bayesian Data Analysis, Third Edition continues to take an applied approach to analysis using up-to-date Bayesian methods. The authors—all leaders in the statistics community—introduce basic concepts from a data-analytic perspective before presenting advanced methods. Throughout the text, numerous worked examples drawn from real applications and research emphasize the use of Bayesian inference in practice. New to the Third Edition Four new chapters on nonparametric modeling Coverage of weakly informative priors and boundary-avoiding priors Updated discussion of cross-validation and predictive information criteria Improved convergence monitoring and effective sample size calculations for iterative simulation Presentations of Hamiltonian Monte Carlo, variational Bayes, and expectation propagation New and revised software code The book can be used in three different ways. For undergraduate students, it introduces Bayesian inference starting from first principles. For graduate students, the text presents effective current approaches to Bayesian modeling and computation in statistics and related fields. For researchers, it provides an assortment of Bayesian methods in applied statistics. Additional materials, including data sets used in the examples, solutions to selected exercises, and software instructions, are available on the book's web page. **Elements of Simulation** *Routledge* The use of simulation in statistics dates from the start of the 20th century, coinciding with the beginnings of radio broadcasting and the invention of television. Just as radio and television are now commonplace in our everyday lives, simulation methods are now widely used throughout the many branches of statistics, as can be readily appreciated from reading Chapters 1 and 9. The book has grown out of a fifteen-hour lecture course given to third-year mathematics undergraduates at the University of Kent, and it could be used either as an undergraduate or a postgraduate text. Simulation may either be taught as an operational research tool in its own right, or as a mathematical method which cements together different parts of statistics and which may be used in a variety of lecture courses. In the last three chapters indications are made of the varied uses of simulation throughout statistics. Alternatively, simulation may be used to motivate subjects such as the teaching of distribution theory and the manipulation of random variables, and Chapters 4 and 5 especially will hopefully be useful in this respect. **Algorithms and Theory of Computation Handbook, Second Edition, Volume 2 Special Topics and Techniques** *CRC Press* Algorithms and Theory of Computation Handbook, Second Edition: Special Topics and Techniques provides an up-to-date compendium of fundamental computer science topics and techniques. It also illustrates how the topics and techniques come together to deliver efficient solutions to important practical problems. Along with updating and revising many of the existing chapters, this second edition contains more than 15 new chapters. This edition now covers self-stabilizing and pricing algorithms as well as the theories of privacy and anonymity, databases, computational games, and communication networks. It also discusses computational topology, natural language processing, and grid computing and explores applications in intensity-modulated radiation therapy, voting, DNA research, systems biology, and financial derivatives. This best-selling handbook continues to help computer professionals and engineers find significant information on various algorithmic topics. The expert contributors clearly define the terminology, present basic results and techniques, and offer a number of current references to the in-depth literature. They also provide a glimpse of the major research issues concerning the relevant topics. **Understanding Advanced Statistical Methods** *CRC Press* Providing a much-needed bridge between elementary statistics courses and advanced research methods courses, Understanding Advanced Statistical Methods helps students grasp the fundamental assumptions and machinery behind sophisticated statistical topics, such as logistic regression, maximum likelihood, bootstrapping, nonparametrics, and Bayesian methods. The book teaches students how to properly model, think critically, and design their own studies to avoid common errors. It leads them to think differently not only about math and statistics but also about general research and the scientific method. With a focus on statistical models as producers of data, the book enables students to more easily understand the machinery of advanced statistics. It also downplays the "population" interpretation of statistical models and presents Bayesian methods before frequentist ones. Requiring no prior calculus experience, the text employs a "just-in-time" approach that introduces mathematical topics, including calculus, where needed. Formulas throughout the text are used to explain why calculus and probability are essential in statistical modeling. The authors also intuitively explain the theory and logic behind real data analysis, incorporating a range of application examples from the social, economic, biological, medical, physical, and engineering sciences. Enabling your students to answer the why behind statistical methods, this text teaches them how to successfully draw conclusions when the premises are flawed. It empowers them to use advanced statistical methods with confidence and develop their own statistical recipes. Ancillary materials are available on the book's website. **Modelling Survival Data in Medical Research** *Chapman and Hall/CRC* Data collected on the time to an event—such as the death of a patient in a medical study—is known as survival data. The methods for analyzing survival data can also be used to analyze data on the time to events such as the recurrence of a disease or relief from symptoms. **Modelling Survival Data in Medical Research** begins with an introduction to survival analysis and a description of four studies in which survival data was obtained. These and other data sets are then used to illustrate the techniques presented in the following chapters, including the Cox and Weibull proportional hazards models; accelerated failure time models; models with time-dependent variables; interval-censored survival data; model checking; and use of statistical packages. Designed for statisticians in the pharmaceutical industry and medical research institutes, and for numerate scientists and clinicians analyzing their own data sets, this book also meets the need for an intermediate text which emphasizes the application of the methodology to survival data arising from medical studies. **Polya Urn Models**

CRC Press Incorporating a collection of recent results, Pólya Urn Models deals with discrete probability through the modern and evolving urn theory and its numerous applications. The book first substantiates the realization of distributions with urn arguments and introduces several modern tools, including exchangeability and stochastic processes via urns. It reviews classical probability problems and presents dichromatic Pólya urns as a basic discrete structure growing in discrete time. The author then embeds the discrete Pólya urn scheme in Poisson processes to achieve an equivalent view in continuous time, provides heuristical arguments to connect the Pólya process to the discrete urn scheme, and explores extensions and generalizations. He also discusses how functional equations for moment generating functions can be obtained and solved. The final chapters cover applications of urns to computer science and bioscience. Examining how urns can help conceptualize discrete probability principles, this book provides information pertinent to the modeling of dynamically evolving systems where particles come and go according to governing rules. Introduction to Bayesian Econometrics Cambridge University Press Introduces the increasingly popular Bayesian approach to statistics to graduates and advanced undergraduates. In contrast to the long-standing frequentist approach to statistics, the Bayesian approach makes explicit use of prior information and is based on the subjective view of probability. Bayesian econometrics takes probability theory as applying to all situations in which uncertainty exists, including uncertainty over the values of parameters. A distinguishing feature of this book is its emphasis on classical and Markov chain Monte Carlo (MCMC) methods of simulation. The book is concerned with applications of the theory to important models that are used in economics, political science, biostatistics, and other applied fields. These include the linear regression model and extensions to Tobit, probit, and logit models; time series models; and models involving endogenous variables. Foundations of Statistics for Data Scientists With R and Python CRC Press Foundations of Statistics for Data Scientists: With R and Python is designed as a textbook for a one- or two-term introduction to mathematical statistics for students training to become data scientists. It is an in-depth presentation of the topics in statistical science with which any data scientist should be familiar, including probability distributions, descriptive and inferential statistical methods, and linear modeling. The book assumes knowledge of basic calculus, so the presentation can focus on "why it works" as well as "how to do it." Compared to traditional "mathematical statistics" textbooks, however, the book has less emphasis on probability theory and more emphasis on using software to implement statistical methods and to conduct simulations to illustrate key concepts. All statistical analyses in the book use R software, with an appendix showing the same analyses with Python. The book also introduces modern topics that do not normally appear in mathematical statistics texts but are highly relevant for data scientists, such as Bayesian inference, generalized linear models for non-normal responses (e.g., logistic regression and Poisson loglinear models), and regularized model fitting. The nearly 500 exercises are grouped into "Data Analysis and Applications" and "Methods and Concepts." Appendices introduce R and Python and contain solutions for odd-numbered exercises. The book's website has expanded R, Python, and Matlab appendices and all data sets from the examples and exercises. Statistical and Probabilistic Methods in Actuarial Science CRC Press Statistical and Probabilistic Methods in Actuarial Science covers many of the diverse methods in applied probability and statistics for students aspiring to careers in insurance, actuarial science, and finance. The book builds on students' existing knowledge of probability and statistics by establishing a solid and thorough understanding of An Introduction to Statistical Inference and Its Applications with R CRC Press Emphasizing concepts rather than recipes, An Introduction to Statistical Inference and Its Applications with R provides a clear exposition of the methods of statistical inference for students who are comfortable with mathematical notation. Numerous examples, case studies, and exercises are included. R is used to simplify computation, create figures Introduction to Probability, Second Edition CRC Press Developed from celebrated Harvard statistics lectures, Introduction to Probability provides essential language and tools for understanding statistics, randomness, and uncertainty. The book explores a wide variety of applications and examples, ranging from coincidences and paradoxes to Google PageRank and Markov chain Monte Carlo (MCMC). Additional application areas explored include genetics, medicine, computer science, and information theory. The authors present the material in an accessible style and motivate concepts using real-world examples. Throughout, they use stories to uncover connections between the fundamental distributions in statistics and conditioning to reduce complicated problems to manageable pieces. The book includes many intuitive explanations, diagrams, and practice problems. Each chapter ends with a section showing how to perform relevant simulations and calculations in R, a free statistical software environment. The second edition adds many new examples, exercises, and explanations, to deepen understanding of the ideas, clarify subtle concepts, and respond to feedback from many students and readers. New supplementary online resources have been developed, including animations and interactive visualizations, and the book has been updated to dovetail with these resources. Supplementary material is available on Joseph Blitzstein's website www.stat110.net. The supplements include: Solutions to selected exercises Additional practice problems Handouts including review material and sample exams Animations and interactive visualizations created in connection with the edX online version of Stat 110. Links to lecture videos available on iTunes U and YouTube There is also a complete instructor's solutions manual available to instructors who require the book for a course. Linear Models with R, Second Edition CRC Press A Hands-On Way to Learning Data Analysis Part of the core of statistics, linear models are used to make predictions and explain the relationship between the response and the predictors. Understanding linear models is crucial to a broader competence in the practice of statistics. Linear Models with R, Second Edition explains how to use linear models in physical science, engineering, social science, and business applications. The book incorporates several improvements that reflect how the world of R has greatly expanded since the publication of the first edition. New to the Second Edition Reorganized material on interpreting linear models, which distinguishes the main applications of prediction and explanation and introduces elementary notions of causality Additional topics, including QR decomposition, splines, additive models, Lasso, multiple imputation, and false discovery rates Extensive use of the ggplot2 graphics package in addition to base graphics Like its widely praised, best-selling predecessor, this edition combines statistics and R to seamlessly give a coherent exposition of the practice of linear modeling. The text offers up-to-date insight on essential data analysis topics, from estimation, inference, and prediction to missing data, factorial models, and block designs. Numerous examples illustrate how to apply the different methods using R. Bayesian Networks With Examples in R CRC Press Bayesian Networks: With Examples in R, Second Edition introduces Bayesian networks using a hands-on approach. Simple yet meaningful examples illustrate each step of the modelling process and discuss side by side the underlying theory and its application using R code. The examples start from the simplest notions and gradually increase in complexity. In particular, this new edition contains significant new material on topics from modern machine-learning practice: dynamic networks, networks with heterogeneous variables, and model validation. The first three chapters explain the whole process of Bayesian network modelling, from structure learning to parameter learning to inference. These chapters cover discrete, Gaussian, and conditional Gaussian Bayesian networks. The following two chapters delve into dynamic networks (to model temporal data) and into networks including arbitrary random variables (using Stan). The book then gives a concise but rigorous treatment of the fundamentals of Bayesian networks and offers an introduction to causal Bayesian networks. It also presents an overview of R packages and other software implementing Bayesian networks. The final chapter evaluates two real-world examples: a landmark causal protein-signalling network published in Science and a probabilistic graphical model for predicting the composition of different body parts. Covering theoretical and practical aspects of Bayesian networks, this book provides you with an introductory overview of the field. It gives you a clear, practical understanding of the key points behind this modelling approach and, at the same time, it makes you familiar with the most relevant packages used to implement real-world analyses in R. The examples covered in the book span several application fields, data-driven models and expert systems, probabilistic and causal perspectives, thus giving you a starting point to work in a variety of scenarios. Online supplementary materials include the data sets and the code used in the book, which will all be made available from <https://www.bnlearn.com/book-crc-2ed/> Principles and Practice of Clinical Trials Springer Nature Statistical Theory A Concise Introduction CRC Press Designed for a one-semester advanced undergraduate or graduate course, Statistical Theory: A Concise Introduction clearly explains the underlying ideas and principles of major statistical concepts, including parameter estimation, confidence intervals, hypothesis testing, asymptotic analysis, Bayesian inference, and elements of decision theory. It i Statistics in Engineering With Examples in MATLAB® and R, Second Edition CRC Press Engineers are expected to design structures and machines that can operate in challenging and volatile environments, while allowing for variation in materials and noise in measurements and signals. Statistics in Engineering, Second Edition: With Examples in MATLAB and R covers the fundamentals of probability and statistics and explains how to use these basic techniques to estimate and model random variation in the context of engineering analysis and design in all types of environments. The first eight chapters cover probability and probability distributions, graphical displays of data and descriptive statistics, combinations of random variables and propagation of error, statistical inference, bivariate distributions and correlation, linear regression on a single predictor variable, and the measurement error model. This leads to chapters including multiple regression; comparisons of several means and split-plot designs together with analysis of variance; probability models; and sampling strategies. Distinctive features include: All examples based on work in industry, consulting to industry, and research for industry Examples and case studies include all engineering disciplines Emphasis on probabilistic modeling including decision trees, Markov chains and processes, and structure functions Intuitive explanations are followed by succinct mathematical justifications Emphasis on random number generation that is used for stochastic simulations of engineering systems, demonstration of key concepts, and implementation of bootstrap methods for inference Use of MATLAB and the open source software R, both of which have an extensive range of statistical functions for standard analyses and also enable programing of specific applications Use of multiple regression for times series models and analysis of factorial and central composite designs Inclusion of topics such as Weibull analysis of failure times and split-plot designs that are commonly used in industry but are not usually included in introductory textbooks Experiments designed to show fundamental concepts that have been tested with large classes working in small groups Website with additional materials that is regularly updated Andrew Metcalfe, David Green, Andrew Smith, and Jonathan Tuke have taught probability and statistics to students of engineering at the University of Adelaide for many years and have substantial industry experience. Their current research includes applications to water resources engineering, mining, and telecommunications. Mahayaudin Mansor worked in banking and insurance before teaching statistics and business mathematics at the Universiti Tun Abdul Razak Malaysia and is currently a researcher specializing in data analytics and quantitative research in the Health Economics and Social Policy Research Group at the Australian Centre for Precision Health, University of South Australia. Tony Greenfield, formerly Head of Process Computing and Statistics at the British Iron and Steel Research Association, is a statistical consultant. He has been awarded the Chambers Medal for outstanding services to the Royal Statistical Society; the George Box Medal by the European Network for Business and Industrial Statistics for Outstanding Contributions to Industrial Statistics; and the William G. Hunter Award by the American Society for Quality. Statistical Inference An Integrated Approach, Second Edition CRC Press A Balanced Treatment of Bayesian and Frequentist Inference Statistical Inference: An Integrated Approach, Second Edition presents an account of the Bayesian and frequentist approaches to statistical inference. Now with an additional author, this second edition places a more balanced emphasis on both perspectives than the first edition. New to the Second Edition New material on empirical Bayes and penalized likelihoods and their impact on regression models Expanded material on hypothesis testing, method of moments, bias correction, and hierarchical models More examples and exercises More comparison between the approaches, including their similarities and differences Designed for advanced undergraduate and graduate courses, the text thoroughly covers statistical inference without delving too deep into technical details. It compares the Bayesian and frequentist schools of thought and explores procedures that lie on the border between the two. Many examples illustrate the methods and models, and exercises are included at the end of each chapter. Modern Data Science with R CRC Press From a review of the first edition: "Modern Data Science with R... is rich with examples and is guided by a strong narrative voice. What's more, it presents an organizing framework that makes a convincing argument that data science is a course distinct from applied statistics"

(The American Statistician). **Modern Data Science with R** is a comprehensive data science textbook for undergraduates that incorporates statistical and computational thinking to solve real-world data problems. Rather than focus exclusively on case studies or programming syntax, this book illustrates how statistical programming in the state-of-the-art R/RStudio computing environment can be leveraged to extract meaningful information from a variety of data in the service of addressing compelling questions. The second edition is updated to reflect the growing influence of the tidyverse set of packages. All code in the book has been revised and styled to be more readable and easier to understand. New functionality from packages like `sf`, `purrr`, `tidymodels`, and `tidytext` is now integrated into the text. All chapters have been revised, and several have been split, re-organized, or re-imagined to meet the shifting landscape of best practice. **Modern Data Science with R** *CRC Press* **Modern Data Science with R** is a comprehensive data science textbook for undergraduates that incorporates statistical and computational thinking to solve real-world problems with data. Rather than focus exclusively on case studies or programming syntax, this book illustrates how statistical programming in the state-of-the-art R/RStudio computing environment can be leveraged to extract meaningful information from a variety of data in the service of addressing compelling statistical questions. Contemporary data science requires a tight integration of knowledge from statistics, computer science, mathematics, and a domain of application. This book will help readers with some background in statistics and modest prior experience with coding develop and practice the appropriate skills to tackle complex data science projects. The book features a number of exercises and has a flexible organization conducive to teaching a variety of semester courses. **Data Science and Machine Learning Mathematical and Statistical Methods** *CRC Press* "This textbook is a well-rounded, rigorous, and informative work presenting the mathematics behind modern machine learning techniques. It hits all the right notes: the choice of topics is up-to-date and perfect for a course on data science for mathematics students at the advanced undergraduate or early graduate level. This book fills a sorely-needed gap in the existing literature by not sacrificing depth for breadth, presenting proofs of major theorems and subsequent derivations, as well as providing a copious amount of Python code. I only wish a book like this had been around when I first began my journey!" -Nicholas Hoell, University of Toronto "This is a well-written book that provides a deeper dive into data-scientific methods than many introductory texts. The writing is clear, and the text logically builds up regularization, classification, and decision trees. Compared to its probable competitors, it carves out a unique niche. -Adam Loy, Carleton College The purpose of **Data Science and Machine Learning: Mathematical and Statistical Methods** is to provide an accessible, yet comprehensive textbook intended for students interested in gaining a better understanding of the mathematics and statistics that underpin the rich variety of ideas and machine learning algorithms in data science. Key Features: Focuses on mathematical understanding. Presentation is self-contained, accessible, and comprehensive. Extensive list of exercises and worked-out examples. Many concrete algorithms with Python code. Full color throughout. The Authors: Dirk P. Kroese, PhD, is a Professor of Mathematics and Statistics at The University of Queensland. He has published over 120 articles and five books in a wide range of areas in mathematics, statistics, data science, machine learning, and Monte Carlo methods. He is a pioneer of the well-known Cross-Entropy method—an adaptive Monte Carlo technique, which is being used around the world to help solve difficult estimation and optimization problems in science, engineering, and finance. Zdravko Botev, PhD, is an Australian Mathematical Science Institute Lecturer in Data Science and Machine Learning with an appointment at the University of New South Wales in Sydney, Australia. He is the recipient of the 2018 Christopher Heyde Medal of the Australian Academy of Science for distinguished research in the Mathematical Sciences. Thomas Taimre, PhD, is a Senior Lecturer of Mathematics and Statistics at The University of Queensland. His research interests range from applied probability and Monte Carlo methods to applied physics and the remarkably universal self-mixing effect in lasers. He has published over 100 articles, holds a patent, and is the coauthor of *Handbook of Monte Carlo Methods* (Wiley). Radislav Vaisman, PhD, is a Lecturer of Mathematics and Statistics at The University of Queensland. His research interests lie at the intersection of applied probability, machine learning, and computer science. He has published over 20 articles and two books. **Advances in Computer Science and IT** *BoD – Books on Demand* The book presents some very interesting and excellent articles for this divergent title. The 22 chapters presented here cover core topics of computer science such as visualization of large databases, security, ontology, user interface, graphs, object oriented software developments, and on the engineering side filtering, motion dynamics, adaptive fuzzy logic, and hyper static mechanical systems. It also covers topics which are combination of computer science and engineering such as meta computing, future mobiles, colour image analysis, relative representation and recognition, and neural networks. The book will serve a unique purpose through these multi-disciplined topics to share different but interesting views on each of these topics. **Beyond ANOVA Basics of Applied Statistics** *CRC Press* Renowned statistician R.G. Miller set the pace for statistics students with **Beyond ANOVA: Basics of Applied Statistics**. Designed to show students how to work with a set of "real world data," Miller's text goes beyond any specific discipline, and considers a whole variety of techniques from ANOVA to empirical Bayes methods; the jackknife, bootstrap methods; and the James-Stein estimator. This reissue of Miller's classic book has been revised by professors at Stanford University, California. As before, one of the main strengths of **Beyond ANOVA** is its promotion of the use of the most straightforward data analysis methods-giving students a viable option, instead of resorting to complicated and unnecessary tests. Assuming a basic background in statistics, **Beyond ANOVA** is written for undergraduates and graduate statistics students. Its approach will also be valued by biologists, social scientists, engineers, and anyone who may wish to handle their own data analysis. **Ecological Forecasting** *Princeton University Press* An authoritative and accessible introduction to the concepts and tools needed to make ecology a more predictive science Ecologists are being asked to respond to unprecedented environmental challenges. How can they provide the best available scientific information about what will happen in the future? **Ecological Forecasting** is the first book to bring together the concepts and tools needed to make ecology a more predictive science. **Ecological Forecasting** presents a new way of doing ecology. A closer connection between data and models can help us to project our current understanding of ecological processes into new places and times. This accessible and comprehensive book covers a wealth of topics, including Bayesian calibration and the complexities of real-world data; uncertainty quantification, partitioning, propagation, and analysis; feedbacks from models to measurements; state-space models and data fusion; iterative forecasting and the forecast cycle; and decision support. Features case studies that highlight the advances and opportunities in forecasting across a range of ecological subdisciplines, such as epidemiology, fisheries, endangered species, biodiversity, and the carbon cycle Presents a probabilistic approach to prediction and iteratively updating forecasts based on new data Describes statistical and informatics tools for bringing models and data together, with emphasis on: Quantifying and partitioning uncertainties Dealing with the complexities of real-world data Feedbacks to identifying data needs, improving models, and decision support Numerous hands-on activities in R available online **Introduction to Statistical Methods for Clinical Trials** *CRC Press* Clinical trials have become essential research tools for evaluating the benefits and risks of new interventions for the treatment and prevention of diseases, from cardiovascular disease to cancer to AIDS. Based on the authors' collective experiences in this field, **Introduction to Statistical Methods for Clinical Trials** presents various statistical topics relevant to the design, monitoring, and analysis of a clinical trial. After reviewing the history, ethics, protocol, and regulatory issues of clinical trials, the book provides guidelines for formulating primary and secondary questions and translating clinical questions into statistical ones. It examines designs used in clinical trials, presents methods for determining sample size, and introduces constrained randomization procedures. The authors also discuss how various types of data must be collected to answer key questions in a trial. In addition, they explore common analysis methods, describe statistical methods that determine what an emerging trend represents, and present issues that arise in the analysis of data. The book concludes with suggestions for reporting trial results that are consistent with universal guidelines recommended by medical journals. Developed from a course taught at the University of Wisconsin for the past 25 years, this textbook provides a solid understanding of the statistical approaches used in the design, conduct, and analysis of clinical trials. **Statistical Rethinking A Bayesian Course with Examples in R and Stan** *CRC Press* **Statistical Rethinking: A Bayesian Course with Examples in R and Stan** builds readers' knowledge of and confidence in statistical modeling. Reflecting the need for even minor programming in today's model-based statistics, the book pushes readers to perform step-by-step calculations that are usually automated. This unique computational approach ensures that readers understand enough of the details to make reasonable choices and interpretations in their own modeling work. The text presents generalized linear multilevel models from a Bayesian perspective, relying on a simple logical interpretation of Bayesian probability and maximum entropy. It covers from the basics of regression to multilevel models. The author also discusses measurement error, missing data, and Gaussian process models for spatial and network autocorrelation. By using complete R code examples throughout, this book provides a practical foundation for performing statistical inference. Designed for both PhD students and seasoned professionals in the natural and social sciences, it prepares them for more advanced or specialized statistical modeling. **Web Resource** The book is accompanied by an R package (`rethinking`) that is available on the author's website and GitHub. The two core functions (`map` and `map2stan`) of this package allow a variety of statistical models to be constructed from standard model formulas. **R for Health Data Science** *CRC Press* In this age of information, the manipulation, analysis, and interpretation of data have become a fundamental part of professional life; nowhere more so than in the delivery of healthcare. From the understanding of disease and the development of new treatments, to the diagnosis and management of individual patients, the use of data and technology is now an integral part of the business of healthcare. Those working in healthcare interact daily with data, often without realising it. The conversion of this avalanche of information to useful knowledge is essential for high-quality patient care. **R for Health Data Science** includes everything a healthcare professional needs to go from R novice to R guru. By the end of this book, you will be taking a sophisticated approach to health data science with beautiful visualisations, elegant tables, and nuanced analyses. Features Provides an introduction to the fundamentals of R for healthcare professionals Highlights the most popular statistical approaches to health data science Written to be as accessible as possible with minimal mathematics Emphasises the importance of truly understanding the underlying data through the use of plots Includes numerous examples that can be adapted for your own data Helps you create publishable documents and collaborate across teams With this book, you are in safe hands - Prof. Harrison is a clinician and Dr. Pius is a data scientist, bringing 25 years' combined experience of using R at the coal face. This content has been taught to hundreds of individuals from a variety of backgrounds, from rank beginners to experts moving to R from other platforms. **Bayesian Methods for Data Analysis, Third Edition** *CRC Press* Broadening its scope to nonstatisticians, **Bayesian Methods for Data Analysis, Third Edition** provides an accessible introduction to the foundations and applications of Bayesian analysis. Along with a complete reorganization of the material, this edition concentrates more on hierarchical Bayesian modeling as implemented via Markov chain Monte Carlo (MCMC) methods and related data analytic techniques. New to the Third Edition New data examples, corresponding R and WinBUGS code, and homework problems Explicit descriptions and illustrations of hierarchical modeling—now commonplace in Bayesian data analysis A new chapter on Bayesian design that emphasizes Bayesian clinical trials A completely revised and expanded section on ranking and histogram estimation A new case study on infectious disease modeling and the 1918 flu epidemic A solutions manual for qualifying instructors that contains solutions, computer code, and associated output for every homework problem—available both electronically and in print Ideal for Anyone Performing Statistical Analyses Focusing on applications from biostatistics, epidemiology, and medicine, this text builds on the popularity of its predecessors by making it suitable for even more practitioners and students. **Epidemiology Study Design and Data Analysis, Third Edition** *CRC Press* Highly praised for its broad, practical coverage, the second edition of this popular text incorporated the major statistical models and issues relevant to epidemiological studies. **Epidemiology: Study Design and Data Analysis, Third Edition** continues to focus on the quantitative aspects of epidemiological research. Updated and expanded, this edition shows students how statistical principles and techniques can help solve epidemiological problems. New to the Third Edition New chapter on risk scores and clinical decision rules New chapter on computer-intensive methods, including the bootstrap, permutation tests, and missing value imputation New sections on binomial regression models, competing risk, information criteria,

propensity scoring, and splines Many more exercises and examples using both Stata and SAS More than 60 new figures After introducing study design and reviewing all the standard methods, this self-contained book takes students through analytical methods for both general and specific epidemiological study designs, including cohort, case-control, and intervention studies. In addition to classical methods, it now covers modern methods that exploit the enormous power of contemporary computers. The book also addresses the problem of determining the appropriate size for a study, discusses statistical modeling in epidemiology, covers methods for comparing and summarizing the evidence from several studies, and explains how to use statistical models in risk forecasting and assessing new biomarkers. The author illustrates the techniques with numerous real-world examples and interprets results in a practical way. He also includes an extensive list of references for further reading along with exercises to reinforce understanding. Web Resource A wealth of supporting material can be downloaded from the book's CRC Press web page, including: Real-life data sets used in the text SAS and Stata programs used for examples in the text SAS and Stata programs for special techniques covered Sample size spreadsheet Web and Network Data Science Modeling Techniques in Predictive Analytics FT Press Master modern web and network data modeling: both theory and applications. In Web and Network Data Science, a top faculty member of Northwestern University's prestigious analytics program presents the first fully-integrated treatment of both the business and academic elements of web and network modeling for predictive analytics. Some books in this field focus either entirely on business issues (e.g., Google Analytics and SEO); others are strictly academic (covering topics such as sociology, complexity theory, ecology, applied physics, and economics). This text gives today's managers and students what they really need: integrated coverage of concepts, principles, and theory in the context of real-world applications. Building on his pioneering Web Analytics course at Northwestern University, Thomas W. Miller covers usability testing, Web site performance, usage analysis, social media platforms, search engine optimization (SEO), and many other topics. He balances this practical coverage with accessible and up-to-date introductions to both social network analysis and network science, demonstrating how these disciplines can be used to solve real business problems. Geospatial Analysis of Environmental Health Springer Science & Business Media This book focuses on a range of geospatial applications for environmental health research, including environmental justice issues, environmental health disparities, air and water contamination, and infectious diseases. Environmental health research is at an exciting point in its use of geotechnologies, and many researchers are working on innovative approaches. This book is a timely scholarly contribution in updating the key concepts and applications of using GIS and other geospatial methods for environmental health research. Each chapter contains original research which utilizes a geotechnical tool (Geographic Information Systems (GIS), remote sensing, GPS, etc.) to address an environmental health problem. The book is divided into three sections organized around the following themes: issues in GIS and environmental health research; using GIS to assess environmental health impacts; and geospatial methods for environmental health. Representing diverse case studies and geospatial methods, the book is likely to be of interest to researchers, practitioners and students across the geographic and environmental health sciences. The authors are leading researchers and practitioners in the field of GIS and environmental health. Statistical Analysis of Financial Data With Examples In R CRC Press Statistical Analysis of Financial Data covers the use of statistical analysis and the methods of data science to model and analyze financial data. The first chapter is an overview of financial markets, describing the market operations and using exploratory data analysis to illustrate the nature of financial data. The software used to obtain the data for the examples in the first chapter and for all computations and to produce the graphs is R. However discussion of R is deferred to an appendix to the first chapter, where the basics of R, especially those most relevant in financial applications, are presented and illustrated. The appendix also describes how to use R to obtain current financial data from the internet. Chapter 2 describes the methods of exploratory data analysis, especially graphical methods, and illustrates them on real financial data. Chapter 3 covers probability distributions useful in financial analysis, especially heavy-tailed distributions, and describes methods of computer simulation of financial data. Chapter 4 covers basic methods of statistical inference, especially the use of linear models in analysis, and Chapter 5 describes methods of time series with special emphasis on models and methods applicable to analysis of financial data. Features * Covers statistical methods for analyzing models appropriate for financial data, especially models with outliers or heavy-tailed distributions. * Describes both the basics of R and advanced techniques useful in financial data analysis. * Driven by real, current financial data, not just stale data deposited on some static website. * Includes a large number of exercises, many requiring the use of open-source software to acquire real financial data from the internet and to analyze it. Statistical Methods for Spatial Data Analysis CRC Press Understanding spatial statistics requires tools from applied and mathematical statistics, linear model theory, regression, time series, and stochastic processes. It also requires a mindset that focuses on the unique characteristics of spatial data and the development of specialized analytical tools designed explicitly for spatial data analysis. Statistical Methods for Spatial Data Analysis answers the demand for a text that incorporates all of these factors by presenting a balanced exposition that explores both the theoretical foundations of the field of spatial statistics as well as practical methods for the analysis of spatial data. This book is a comprehensive and illustrative treatment of basic statistical theory and methods for spatial data analysis, employing a model-based and frequentist approach that emphasizes the spatial domain. It introduces essential tools and approaches including: measures of autocorrelation and their role in data analysis; the background and theoretical framework supporting random fields; the analysis of mapped spatial point patterns; estimation and modeling of the covariance function and semivariogram; a comprehensive treatment of spatial analysis in the spectral domain; and spatial prediction and kriging. The volume also delivers a thorough analysis of spatial regression, providing a detailed development of linear models with uncorrelated errors, linear models with spatially-correlated errors and generalized linear mixed models for spatial data. It succinctly discusses Bayesian hierarchical models and concludes with reviews on simulating random fields, non-stationary covariance, and spatio-temporal processes. Additional material on the CRC Press website supplements the content of this book. The site provides data sets used as examples in the text, software code that can be used to implement many of the principal methods described and illustrated, and updates to the text itself. Stochastic Dynamics, Filtering and Optimization Cambridge University Press Targeted at graduate students, researchers and practitioners in the field of science and engineering, this book gives a self-contained introduction to a measure-theoretic framework in laying out the definitions and basic concepts of random variables and stochastic diffusion processes. It then continues to weave into a framework of several practical tools and applications involving stochastic dynamical systems. These include tools for the numerical integration of such dynamical systems, nonlinear stochastic filtering and generalized Bayesian update theories for solving inverse problems and a new stochastic search technique for treating a broad class of non-convex optimization problems. MATLAB codes for all the applications are uploaded on the companion website. The Metrics Manifesto Confronting Security with Data John Wiley & Sons Security professionals are trained skeptics. They poke and prod at other people's digital creations, expecting them to fail in unexpected ways. Shouldn't that same skeptical power be turned inward? Shouldn't practitioners ask: "How do I know that my enterprise security capabilities work? Are they scaling, accelerating, or slowing as the business exposes more value to more people and through more channels at higher velocities?" This is the start of the modern measurement mindset—the mindset that seeks to confront security with data. The Metrics Manifesto: Confronting Security with Data delivers an examination of security metrics with R, the popular open-source programming language and software development environment for statistical computing. This insightful and up-to-date guide offers readers a practical focus on applied measurement that can prove or disprove the efficacy of information security measures taken by a firm. The book's detailed chapters combine topics like security, predictive analytics, and R programming to present an authoritative and innovative approach to security metrics. The author and security professional examines historical and modern methods of measurement with a particular emphasis on Bayesian Data Analysis to shed light on measuring security operations. Readers will learn how processing data with R can help measure security improvements and changes as well as help technology security teams identify and fix gaps in security. The book also includes downloadable code for people who are new to the R programming language. Perfect for security engineers, risk engineers, IT security managers, CISOs, and data scientists comfortable with a bit of code, The Metrics Manifesto offers readers an invaluable collection of information to help professionals prove the efficacy of security measures within their company. Algorithms and Theory of Computation Handbook, Second Edition, Volume 1 General Concepts and Techniques CRC Press Algorithms and Theory of Computation Handbook, Second Edition: General Concepts and Techniques provides an up-to-date compendium of fundamental computer science topics and techniques. It also illustrates how the topics and techniques come together to deliver efficient solutions to important practical problems. Along with updating and revising many of the existing chapters, this second edition contains four new chapters that cover external memory and parameterized algorithms as well as computational number theory and algorithmic coding theory. This best-selling handbook continues to help computer professionals and engineers find significant information on various algorithmic topics. The expert contributors clearly define the terminology, present basic results and techniques, and offer a number of current references to the in-depth literature. They also provide a glimpse of the major research issues concerning the relevant topics.