

Fundamentals Of Applied Probability And Random Processes

This text is designed for an introductory probability course at the university level for sophomores, juniors, and seniors in mathematics, physical and social sciences, engineering, and computer science. It presents a thorough treatment of ideas and techniques necessary for a firm understanding of the subject. The text is also recommended for use in discrete probability courses. The material is organized so that the discrete and continuous probability discussions are presented in a separate, but parallel, manner. This organization does not emphasize an

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overly rigorous or formal view of probability and therefore offers some strong pedagogical value. Hence, the discrete discussions can sometimes serve to motivate the more abstract continuous probability discussions. Features: Key ideas are developed in a somewhat leisurely style, providing a variety of interesting applications to probability and showing some nonintuitive ideas. Over 600 exercises provide the opportunity for practicing skills and developing a sound understanding of ideas. Numerous historical comments deal with the development of discrete probability. The text includes many computer programs that illustrate the algorithms or the methods of computation for important problems. The book is a beautiful introduction to probability theory at the beginning level. The book

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contains a lot of examples and an easy development of theory without any sacrifice of rigor, keeping the abstraction to a minimal level. It is indeed a valuable addition to the study of probability theory. --Zentralblatt

MATH

Introduction to Probability Models, Tenth Edition, provides an introduction to elementary probability theory and stochastic processes. There are two approaches to the study of probability theory. One is heuristic and nonrigorous, and attempts to develop in students an intuitive feel for the subject that enables him or her to think probabilistically. The other approach attempts a rigorous development of probability by using the tools of measure theory. The first approach is employed in this text. The book begins by introducing basic concepts of

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probability theory, such as the random variable, conditional probability, and conditional expectation. This is followed by discussions of stochastic processes, including Markov chains and Poisson processes. The remaining chapters cover queuing, reliability theory, Brownian motion, and simulation. Many examples are worked out throughout the text, along with exercises to be solved by students. This book will be particularly useful to those interested in learning how probability theory can be applied to the study of phenomena in fields such as engineering, computer science, management science, the physical and social sciences, and operations research. Ideally, this text would be used in a one-year course in probability models, or a one-semester course in introductory probability

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theory or a course in elementary stochastic processes. New to this Edition: 65% new chapter material including coverage of finite capacity queues, insurance risk models and Markov chains Contains compulsory material for new Exam 3 of the Society of Actuaries containing several sections in the new exams Updated data, and a list of commonly used notations and equations, a robust ancillary package, including a ISM, SSM, and test bank Includes SPSS PASW Modeler and SAS JMP software packages which are widely used in the field Hallmark features: Superior writing style Excellent exercises and examples covering the wide breadth of coverage of probability topics Real-world applications in engineering, science, business and economics

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This book provides a rigorous mathematical treatment of the non-linear stochastic filtering problem using modern methods. Particular emphasis is placed on the theoretical analysis of numerical methods for the solution of the filtering problem via particle methods. The book should provide sufficient background to enable study of the recent literature. While no prior knowledge of stochastic filtering is required, readers are assumed to be familiar with measure theory, probability theory and the basics of stochastic processes. Most of the technical results that are required are stated and proved in the appendices. Exercises and solutions are included. Unlike traditional introductory math/stat textbooks, Probability and Statistics: The Science of Uncertainty brings a modern flavor based on

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incorporating the computer to the course and an integrated approach to inference. From the start the book integrates simulations into its theoretical coverage, and emphasizes the use of computer-powered computation throughout.* Math and science majors with just one year of calculus can use this text and experience a refreshing blend of applications and theory that goes beyond merely mastering the technicalities. They'll get a thorough grounding in probability theory, and go beyond that to the theory of statistical inference and its applications. An integrated approach to inference is presented that includes the frequency approach as well as Bayesian methodology. Bayesian inference is developed as a logical extension of likelihood methods. A separate

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chapter is devoted to the important topic of model checking and this is applied in the context of the standard applied statistical techniques.

Examples of data analyses using real-world data are presented throughout the text. A final chapter introduces a number of the most important stochastic process models using elementary methods. *Note: An appendix in the book contains Minitab code for more involved computations. The code can be used by students as templates for their own calculations. If a software package like Minitab is used with the course then no programming is required by the students.

An Introduction with Applications in
Data Science

An Introduction with Computer
Science Applications

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A Fresh Approach Using R
Statistics and Probability for
Engineering Applications
Applications to Communications,
Signal Processing, Queueing Theory
and Mathematical Finance

This book is a fresh approach to a calculus based, first course in probability and statistics, using R throughout to give a central role to data and simulation. The book introduces probability with Monte Carlo simulation as an essential tool. Simulation makes challenging probability questions quickly accessible and easily understandable. Mathematical approaches are included, using calculus when appropriate, but are always

connected to experimental computations. Using R and simulation gives a nuanced understanding of statistical inference. The impact of departure from assumptions in statistical tests is emphasized, quantified using simulations, and demonstrated with real data. The book compares parametric and non-parametric methods through simulation, allowing for a thorough investigation of testing error and power. The text builds R skills from the outset, allowing modern methods of resampling and cross validation to be introduced along with

traditional statistical techniques. Fifty-two data sets are included in the complementary R package fosdata. Most of these data sets are from recently published papers, so that you are working with current, real data, which is often large and messy. Two central chapters use powerful tidyverse tools (dplyr, ggplot2, tidyr, stringr) to wrangle data and produce meaningful visualizations. Preliminary versions of the book have been used for five semesters at Saint Louis University, and the majority of the more than 400 exercises have been classroom tested.

Probabilistic Foundations of Statistical Network Analysis presents a fresh and insightful perspective on the fundamental tenets and major challenges of modern network analysis. Its lucid exposition provides necessary background for understanding the essential ideas behind exchangeable and dynamic network models, network sampling, and network statistics such as sparsity and power law, all of which play a central role in contemporary data science and machine learning applications. The book rewards readers with a clear and intuitive

understanding of the subtle interplay between basic principles of statistical inference, empirical properties of network data, and technical concepts from probability theory. Its mathematically rigorous, yet non-technical, exposition makes the book accessible to professional data scientists, statisticians, and computer scientists as well as practitioners and researchers in substantive fields.

Newcomers and non-quantitative researchers will find its conceptual approach invaluable for developing intuition about technical ideas from statistics and probability,

while experts and graduate students will find the book a handy reference for a wide range of new topics, including edge exchangeability, relative exchangeability, graphon and graphex models, and graph-valued Levy process and rewiring models for dynamic networks. The author's incisive commentary supplements these core concepts, challenging the reader to push beyond the current limitations of this emerging discipline. With an approachable exposition and more than 50 open research problems and exercises with solutions, this book is ideal for advanced

Processes.
undergraduate and graduate students interested in modern network analysis, data science, machine learning, and statistics. Harry Crane is Associate Professor and Co-Director of the Graduate Program in Statistics and Biostatistics and an Associate Member of the Graduate Faculty in Philosophy at Rutgers University. Professor Crane's research interests cover a range of mathematical and applied topics in network science, probability theory, statistical inference, and mathematical logic. In addition to his technical work on edge and relational

exchangeability, relative exchangeability, and graph-valued Markov processes, Prof. Crane's methods have been applied to domain-specific cybersecurity and counterterrorism problems at the Foreign Policy Research Institute and RAND's Project AIR FORCE.

Miller and Childers have focused on creating a clear presentation of foundational concepts with specific applications to signal processing and communications, clearly the two areas of most interest to students and instructors in this course. It is aimed at

graduate students as well as practicing engineers, and includes unique chapters on narrowband random processes and simulation techniques. The appendices provide a refresher in such areas as linear algebra, set theory, random variables, and more. Probability and Random Processes also includes applications in digital communications, information theory, coding theory, image processing, speech analysis, synthesis and recognition, and other fields. * Exceptional exposition and numerous worked out problems make the book extremely readable and

accessible * The authors connect the applications discussed in class to the textbook * The new edition contains more real world signal processing and communications applications * Includes an entire chapter devoted to simulation techniques

This 4-part treatment begins with algebra and analytic geometry and proceeds to an exploration of the calculus of algebraic functions and transcendental functions and applications. 1985 edition. Includes 310 figures and 18 tables.

Fundamentals of Matrix-

Analytic Methods

Fundamentals of Mathematical Statistics

with Stochastic Processes, Third Edition

Fundamentals of Causal Inference

Fundamentals of Probability and Stochastic Processes with Applications to Communications

This book presents fundamentals of reliability engineering with its applications in evaluating reliability of multistage interconnection networks. In the first part of the book, it introduces the concept of reliability engineering, elements of probability theory, probability distributions, availability and data analysis. The second part of the book provides an overview of

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parallel/distributed computing, network design considerations, and more. The book covers a comprehensive reliability engineering methods and its practical aspects in the interconnection network systems. Students, engineers, researchers, managers will find this book as a valuable reference source. This book provides a versatile and lucid treatment of classic as well as modern probability theory, while integrating them with core topics in statistical theory and also some key tools in machine learning. It is written in an extremely accessible style, with elaborate motivating discussions and numerous worked out examples and exercises. The book has 20 chapters on a wide range of topics, 423 worked out examples, and 808 exercises. It is unique in its unification of probability and statistics, its coverage and its

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superb exercise sets, detailed bibliography, and in its substantive treatment of many topics of current importance. This book can be used as a text for a year long graduate course in statistics, computer science, or mathematics, for self-study, and as an invaluable research reference on probability and its applications. Particularly worth mentioning are the treatments of distribution theory, asymptotics, simulation and Markov Chain Monte Carlo, Markov chains and martingales, Gaussian processes, VC theory, probability metrics, large deviations, bootstrap, the EM algorithm, confidence intervals, maximum likelihood and Bayes estimates, exponential families, kernels, and Hilbert spaces, and a self contained complete review of univariate probability.

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Fundamentals Of Applied Probability And Random Processes

The definitive guide to queueing theory and its practical applications—features numerous real-world examples of scientific, engineering, and business applications Thoroughly updated and expanded to reflect the latest developments in the field, Fundamentals of Queueing Theory, Fifth Edition presents the statistical principles and processes involved in the analysis of the probabilistic nature of queues. Rather than focus narrowly on a particular application area, the authors illustrate the theory in practice across a range of fields, from computer science and various engineering disciplines to business and operations research. Critically, the text also provides a numerical approach to understanding and making estimations with queueing theory and provides comprehensive

Processes

coverage of both simple and advanced queueing models. As with all

preceding editions, this latest update of the classic text features a unique blend of the theoretical and timely real-world applications. The introductory section has been reorganized with expanded coverage of qualitative/non-mathematical approaches to queueing theory, including a high-level description of queues in everyday life. New sections on non-stationary fluid queues, fairness in queueing, and Little 's Law have been added, as has expanded coverage of stochastic processes, including the Poisson process and Markov chains. • Each chapter provides a self-contained presentation of key concepts and formulas, to allow readers to focus independently on topics relevant to their interests • A summary table at the

end of the book outlines the queues that have been discussed and the types of results that have been obtained for each queue • Examples from a range of disciplines highlight practical issues often encountered when applying the theory to real-world problems • A companion website features QtsPlus, an Excel-based software platform that provides computer-based solutions for most queueing models presented in the book. Featuring chapter-end exercises and problems—all of which have been classroom-tested and refined by the authors in advanced undergraduate and graduate-level courses—Fundamentals of Queueing Theory, Fifth Edition is an ideal textbook for courses in applied mathematics, queueing theory, probability and statistics, and

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also a valuable reference for

practitioners in applied mathematics,

operations research, engineering, and

industrial engineering.

The fundamental mathematical tools

needed to understand machine

learning include linear algebra,

analytic geometry, matrix

decompositions, vector calculus,

optimization, probability and statistics.

These topics are traditionally taught in

disparate courses, making it hard for

data science or computer science

students, or professionals, to efficiently

learn the mathematics. This self-

contained textbook bridges the gap

between mathematical and machine

learning texts, introducing the

mathematical concepts with a

minimum of prerequisites. It uses

these concepts to derive four central

Processes

machine learning methods: linear regression, principal component analysis, Gaussian mixture models and support vector machines. For students and others with a mathematical background, these derivations provide a starting point to machine learning texts. For those learning the mathematics for the first time, the methods help build intuition and practical experience with applying mathematical concepts. Every chapter includes worked examples and exercises to test understanding. Programming tutorials are offered on the book's web site.

Introduction to High-Dimensional
Statistics

Foundations of Data Science

Understanding Why and How

Fundamentals of Queueing Theory

Probability and Conditional

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Statistics is a subject with a vast field of application, involving problems which vary widely in their character and complexity. However, in tackling these, we use a relatively small core of central ideas and methods. This book attempts to concentrate attention on these ideas: they are placed in a general setting and illustrated by relatively simple examples, avoiding wherever possible the extraneous difficulties of complicated mathematical manipulation. In order to compress the central body of ideas into a small volume, it is necessary to assume a fair degree of mathematical sophistication on the part of the reader, and the book is intended for students of mathematics who are already accustomed

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to thinking in rather general terms about spaces and functions

Suitable for self study Use real examples and real data sets that will be familiar to the audience

Introduction to the bootstrap is included – this is a modern method missing in many other books

An integrated package of powerful probabilistic tools and key applications in modern mathematical data science.

Bernard Rosner's FUNDAMENTALS OF BIostatISTICS is a practical introduction to the methods, techniques, and computation of statistics with human subjects. It prepares students for their future courses and careers by introducing the statistical methods most often used in medical literature. Rosner minimizes the amount of

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mathematical formulation (algebra-based) while still giving complete explanations of all the important concepts. As in previous editions, a major strength of this book is that every new concept is developed systematically through completely worked out examples from current medical research problems. Most methods are illustrated with specific instructions as to implementation using software either from SAS, Stata, R, Excel or Minitab. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Random Phenomena

Fundamentals of Biostatistics

Statistical Inference

Fundamentals of Probability: A First Course

The long-awaited revision of Fundamentals of Applied Probability and Random Processes expands on the central components that made the first edition a classic. The title is based on the premise that engineers use probability as a modeling tool, and that probability can be applied to the solution of engineering problems. Engineers and students studying probability and random processes also need to analyze data, and thus need some knowledge of statistics. This book is designed to provide students with a thorough grounding in probability and stochastic

processes, demonstrate their applicability to real-world

problems, and introduce the basics of statistics. The book's clear writing style and homework problems make it ideal for the classroom or for self-study.

Demonstrates concepts with more than 100 illustrations, including 2 dozen new drawings Expands

readers' understanding of disruptive statistics in a new chapter (chapter 8) Provides new chapter on Introduction to

Random Processes with 14 new illustrations and tables explaining key concepts. Includes two chapters devoted to the two branches of statistics, namely descriptive statistics (chapter 8)

and inferential (or inductive) statistics (chapter 9).

Probability and Conditional Expectations bridges the gap between books on probability theory and statistics by providing the probabilistic concepts estimated and tested in analysis of variance, regression analysis, factor analysis, structural equation modeling, hierarchical linear models and analysis of qualitative data. The authors emphasize the theory of conditional expectations that is also fundamental to conditional independence and conditional distributions. *Probability and Conditional Expectations Presents a rigorous and detailed*

Processes
mathematical treatment of probability theory focusing on concepts that are fundamental to understand what we are estimating in applied statistics. Explores the basics of random variables along with extensive coverage of measurable functions and integration. Extensively treats conditional expectations also with respect to a conditional probability measure and the concept of conditional effect functions, which are crucial in the analysis of causal effects. Is illustrated throughout with simple examples, numerous exercises and detailed solutions. Provides website links to further resources including videos of courses

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delivered by the authors as well as R code exercises to help illustrate the theory presented throughout the book.

Knowledge updating is a never-ending process and so should be the revision of an effective textbook. The book originally written fifty years ago has, during the intervening period, been revised and reprinted several times. The authors have, however, been thinking, for the last few years that the book needed not only a thorough revision but rather a substantial rewriting. They now take great pleasure in presenting to the readers the twelfth, thoroughly revised and enlarged, Golden Jubilee edition of

the book. The subject-matter in the entire book has been re-written in the light of numerous criticisms and suggestions received from the users of the earlier editions in India and abroad. The basis of this revision has been the emergence of new literature on the subject, the constructive feedback from students and teaching fraternity, as well as those changes that have been made in the syllabi and/or the pattern of examination papers of numerous universities. Knowledge updating is a never-ending process and so should be the revision of an effective textbook. The book originally written fifty years ago has, during

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twelfth, thoroughly revised and enlarged, Golden Jubilee edition of the book. The subject-matter in the entire book has been re-written in the light of numerous criticisms and suggestions received from the users of the earlier editions in India and abroad. The basis of this revision has been the emergence of new literature on the subject, the constructive feedback from students and teaching fraternity, as well as those changes that have been made in the syllabi and/or the pattern of examination papers of numerous universities. Some prominent additions are given below: 1. Variance of Degenerate Random Variable 2. Approximate

Processes
Expression for Expectation and
Variance 3. Lyapounov's

Inequality 4. Holder's Inequality

5. Minkowski's Inequality 6.

Double Expectation Rule or

Double-E Rule and many others

This book is based on the premise

that engineers use probability as a

modeling tool, and that probability

can be applied to the solution of

engineering problems. Engineers

and students studying probability

and random processes also need

to analyze data, and thus need

some knowledge of statistics. This

book is designed to provide

students with a thorough

grounding in probability and

stochastic processes, demonstrate

their applicability to real-world

problems, and introduce the basics of statistics. The book's

clear writing style and homework

problems make it ideal for the

classroom or for self-study. * Good

and solid introduction to

probability theory and stochastic

processes * Logically organized;

writing is presented in a clear

manner * Choice of topics is

comprehensive within the area of

probability * Ample homework

problems are organized into

chapter sections

Probability, Statistics, and Data

Applied Probability and Stochastic

Processes

With R

Probability with R

Fundamentals of Probability

This book provides engineers with focused treatment of the mathematics needed to understand probability, random variables, and stochastic processes, which are essential mathematical disciplines used in communications engineering. The author explains the basic concepts of these topics as plainly as possible so that people with no in-depth knowledge of these mathematical topics can better appreciate their applications in real problems. Applications examples are drawn from various areas of communications. If a reader is interested in understanding probability and stochastic processes that are specifically important for

systems, this book serves his/her need.

This book provides an introduction to the mathematical and algorithmic foundations of data science, including machine learning, high-dimensional geometry, and analysis of large networks. Topics include the counterintuitive nature of data in high dimensions, important linear algebraic techniques such as singular value decomposition, the theory of random walks and Markov chains, the fundamentals of and important algorithms for machine learning, algorithms and analysis for clustering, probabilistic

models for large networks, representation learning including topic modelling and non-negative matrix factorization, wavelets and compressed sensing. Important probabilistic techniques are developed including the law of large numbers, tail inequalities, analysis of random projections, generalization guarantees in machine learning, and moment methods for analysis of phase transitions in large random graphs. Additionally, important structural and complexity measures are discussed such as matrix norms and VC-dimension. This book is suitable for both undergraduate and graduate courses in the design and

analysis of algorithms for data.

One of the primary motivations for clinical trials and observational studies of humans is to infer cause and effect. Disentangling causation from confounding is of utmost importance. Fundamentals of Causal Inference explains and relates different methods of confounding adjustment in terms of potential outcomes and graphical models, including standardization, difference-in-differences estimation, the front-door method, instrumental variables estimation, and propensity score methods. It also covers effect-measure modification, precision variables, mediation analyses, and time-

dependent confounding. Several real data examples, simulation studies, and analyses using R motivate the methods throughout. The book assumes familiarity with basic statistics and probability, regression, and R and is suitable for seniors or graduate students in statistics, biostatistics, and data science as well as PhD students in a wide variety of other disciplines, including epidemiology, pharmacy, the health sciences, education, and the social, economic, and behavioral sciences. Beginning with a brief history and a review of essential elements of probability and statistics, a unique feature of the book is its focus on real and

simulated datasets with all binary variables to reduce complex methods down to their fundamentals. Calculus is not required, but a willingness to tackle mathematical notation, difficult concepts, and intricate logical arguments is essential. While many real data examples are included, the book also features the Double What-If Study, based on simulated data with known causal mechanisms, in the belief that the methods are best understood in circumstances where they are known to either succeed or fail. Datasets, R code, and solutions to odd-numbered exercises are available at www.routledge.com. This textbook differs from others

in the field in that it has been prepared very much with students and their needs in mind, having been classroom tested over many years. It is a true “learner’s book” made for students who require a deeper understanding of probability and statistics. It presents the fundamentals of the subject along with concepts of probabilistic modelling, and the process of model selection, verification and analysis. Furthermore, the inclusion of more than 100 examples and 200 exercises (carefully selected from a wide range of topics), along with a solutions manual for instructors, means that this text is of real value to students and lecturers across a

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Key features: Presents the fundamentals in probability and statistics along with relevant applications. Explains the concept of probabilistic modelling and the process of model selection, verification and analysis. Definitions and theorems are carefully stated and topics rigorously treated. Includes a chapter on regression analysis. Covers design of experiments. Demonstrates practical problem solving throughout the book with numerous examples and exercises purposely selected from a variety of engineering fields. Includes an accompanying online Solutions

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***Manual for instructors containing
complete step-by-step solutions to all
problems.***

With Stochastic Processes

Methods of Mathematics Applied to

Calculus, Probability, and Statistics

With Applications to Signal

Processing and Communications

The Science of Uncertainty

Fundamentals of Applied

Probability and Random Processes

Fundamentals of

Probability with

Stochastic Processes,

Third Edition teaches

probability in a natural

way through interesting

and instructive examples

and exercises that

motivate the theory, definitions, theorems, and methodology. The author takes a mathematically rigorous approach while closely adhering to the historical development of probability

Provides a comprehensive introduction to probability with an emphasis on computing-related applications This self-contained new and extended edition outlines a first course in probability applied to computer-related disciplines. As in the first edition,

experimentation and simulation are favoured over mathematical proofs. The freely down-loadable statistical programming language R is used throughout the text, not only as a tool for calculation and data analysis, but also to illustrate concepts of probability and to simulate distributions. The examples in Probability with R: An Introduction with Computer Science Applications, Second Edition cover a wide range of computer science applications,

including: testing program performance; measuring response time and CPU time; estimating the reliability of components and systems; evaluating algorithms and queuing systems. Chapters cover: The R language; summarizing statistical data; graphical displays; the fundamentals of probability; reliability; discrete and continuous distributions; and more. This second edition includes: improved R code throughout the text, as well as new procedures, packages and interfaces;

updated and additional examples, exercises and projects covering recent developments of computing; an introduction to bivariate discrete distributions together with the R functions used to handle large matrices of conditional probabilities, which are often needed in machine translation; an introduction to linear regression with particular emphasis on its application to machine learning using testing and training data; a new section on spam filtering

using Bayes theorem to develop the filters; an extended range of Poisson applications such as network failures, website hits, virus attacks and accessing the cloud; use of new allocation functions in R to deal with hash table collision, server overload and the general allocation problem. The book is supplemented with a Wiley Book Companion Site featuring data and solutions to exercises within the book. Primarily addressed to students of computer science and

related areas, Probability with R: An Introduction with Computer Science Applications, Second Edition is also an excellent text for students of engineering and the general sciences. Computing professionals who need to understand the relevance of probability in their areas of practice will find it useful.

Statistics and Probability for Engineering Applications provides a complete discussion of all the major topics typically covered in a college engineering statistics

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course. This textbook minimizes the derivations and mathematical theory, focusing instead on the information and techniques most needed and used in engineering applications. It is filled with practical techniques directly applicable on the job. Written by an experienced industry engineer and statistics professor, this book makes learning statistical methods easier for today's student. This book can be read sequentially like a normal textbook, but it is designed to be used as a

handbook, pointing the reader to the topics and sections pertinent to a particular type of statistical problem. Each new concept is clearly and briefly described, whenever possible by relating it to previous topics. Then the student is given carefully chosen examples to deepen understanding of the basic ideas and how they are applied in engineering. The examples and case studies are taken from real-world engineering problems and use real data. A number of practice

Processes
problems are provided for
each section, with answers

in the back for selected
problems. This book will
appeal to engineers in the
entire engineering
spectrum

(electronics/electrical,
mechanical, chemical, and
civil engineering);

engineering students and
students taking computer
science/computer

engineering graduate
courses; scientists
needing to use applied
statistical methods; and
engineering technicians
and technologists. *

Filled with practical

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*techniques directly applicable on the job * Contains hundreds of solved problems and case studies, using real data sets * Avoids unnecessary theory*

Together with the fundamentals of probability, random processes and statistical analysis, this insightful book also presents a broad range of advanced topics and applications. There is extensive coverage of Bayesian vs. frequentist statistics, time series and spectral representation,

Processes
inequalities, bound and
approximation, maximum-
likelihood estimation and
the expectation-
maximization (EM)

algorithm, geometric
Brownian motion and Itô
process. Applications such
as hidden Markov models
(HMM), the Viterbi, BCJR,
and Baum-Welch algorithms,
algorithms for machine
learning, Wiener and
Kalman filters, and
queueing and loss networks
are treated in detail. The
book will be useful to
students and researchers
in such areas as
communications, signal

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*processing, networks,
machine learning,
bioinformatics,
econometrics and
mathematical finance. With
a solutions manual,
lecture slides,
supplementary materials
and MATLAB programs all
available online, it is
ideal for classroom
teaching as well as a
valuable reference for
professionals.*

*Introduction to
Probability Models
Fundamentals of Applied
Probability Theory
Fundamentals for the
Empirical Sciences*

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***Fundamentals of
Probability and Statistics
for Engineers
Applications in Multistage
Interconnection Networks***

"The 4th edition of Ghahramani's book is replete with intriguing historical notes, insightful comments, and well-selected examples/exercises that, together, capture much of the essence of probability. Along with its Companion Website, the book is suitable as a primary resource for a first course in probability. Moreover, it

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has sufficient material for a sequel course introducing stochastic processes and stochastic simulation." --Nawaf Bou-Rabee, Associate Professor of Mathematics, Rutgers University Camden, USA

"This book is an excellent primer on probability, with an incisive exposition to stochastic processes included as well. The flow of the text aids its readability, and the book is indeed a treasure trove of set and solved problems. Every subtopic within a chapter is supplemented by a

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comprehensive list of exercises, accompanied frequently by self-quizzes, while each chapter ends with a useful summary and another rich collection of review problems." --Dalia Chakrabarty, Department of Mathematical Sciences, Loughborough University, UK "This textbook provides a thorough and rigorous treatment of fundamental probability, including both discrete and continuous cases. The book's ample collection of exercises gives instructors and students a

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great deal of practice and tools to sharpen their understanding. Because the definitions, theorems, and examples are clearly labeled and easy to find, this book is not only a great course accompaniment, but an invaluable reference."

--Joshua Stangle,
Assistant Professor of
Mathematics, University of
Wisconsin - Superior, USA
This one- or two-term
calculus-based basic
probability text is
written for majors in
mathematics, physical
sciences, engineering,

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statistics, actuarial science, business and finance, operations research, and computer science. It presents probability in a natural way: through interesting and instructive examples and exercises that motivate the theory, definitions, theorems, and methodology. This book is mathematically rigorous and, at the same time, closely matches the historical development of probability. Whenever appropriate, historical remarks are included, and the 2096 examples and

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exercises have been carefully designed to arouse curiosity and hence encourage students to delve into the theory with enthusiasm. New to the Fourth Edition: 538 new examples and exercises have been added, almost all of which are of applied nature in realistic contexts Self-quizzes at the end of each section and self-tests at the end of each chapter allow students to check their comprehension of the material An all-new Companion Website includes additional examples,

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complementary topics not covered in the previous editions, and applications for more in-depth studies, as well as a test bank and figure slides. It also includes complete solutions to all self-test and self-quiz problems

Saeed Ghahramani is Professor of Mathematics and Dean of the College of Arts and Sciences at Western New England University. He received his Ph.D. from the University of California at Berkeley in Mathematics and is a recipient of teaching awards from Johns

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The long-awaited revision of Fundamentals of Applied Probability and Random Processes expands on the

central components that made the first edition a classic. The title is based on the premise that engineers use probability as a modeling tool, and that probability can be applied to the solution of engineering problems. Engineers and students studying probability and random processes also need to analyze data, and thus need some knowledge of statistics. This book is designed to provide students with a thorough grounding in probability and stochastic processes, demonstrate their applicability to real-world problems, and introduce the basics of statistics.

The book's clear writing style and homework problems make it ideal for the classroom or for self-study. Demonstrates concepts with more than 100 illustrations, including 2 dozen new drawings Expands readers' understanding of disruptive statistics in a new chapter (chapter 8) Provides new chapter on Introduction to Random Processes with 14 new illustrations and tables explaining key concepts. Includes two chapters devoted to the two branches of statistics, namely descriptive statistics (chapter 8) and inferential (or inductive) statistics (chapter 9).

Probability theory is one branch

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of mathematics that is simultaneously deep and immediately applicable in diverse areas of human endeavor. It is as fundamental as calculus. Calculus explains the external world, and probability theory helps predict a lot of it. In addition, problems in probability theory have an innate appeal, and the answers are often structured and strikingly beautiful. A solid background in probability theory and probability models will become increasingly more useful in the twenty-first century, as difficult new problems emerge, that will require more sophisticated

models and analysis. This is a text on the fundamentals of the theory of probability at an undergraduate or first-year graduate level for students in science, engineering, and economics. The only mathematical background required is knowledge of univariate and multivariate calculus and basic linear algebra. The book covers all of the standard topics in basic probability, such as combinatorial probability, discrete and continuous distributions, moment generating functions, fundamental probability inequalities, the

central limit theorem, and joint and conditional distributions of discrete and continuous random variables. But it also has some unique features and a forward-looking feel.

Many of the problems that engineers face involve randomly varying phenomena of one sort or another. However, if characterized properly, even such randomness and the resulting uncertainty are subject to rigorous mathematical analysis. Taking into account the uniquely multidisciplinary demands of 21st-century science and engineering, Random Phenomena: Fundamentals of

Probability and Statistics for Engineers provides students with a working knowledge of how to solve engineering problems that involve randomly varying phenomena. Basing his approach on the principle of theoretical foundations before application, Dr. Ogunnaike presents a classroom-tested course of study that explains how to master and use probability and statistics appropriately to deal with uncertainty in standard problems and those that are new and unfamiliar. Giving students the tools and confidence to formulate practical solutions to problems,

this book offers many useful features, including: Unique case studies to illustrate the fundamentals and applications of probability and foster understanding of the random variable and its distribution Examples of development, selection, and analysis of probability models for specific random variables Presentation of core concepts and ideas behind statistics and design of experiments Selected "special topics," including reliability and life testing, quality assurance and control, and multivariate analysis As classic scientific boundaries continue to be

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restructured, the use of engineering is spilling over into more non-traditional areas, ranging from molecular biology to finance. This book emphasizes fundamentals and a "first principles" approach to deal with this evolution. It illustrates theory with practical examples and case studies, equipping readers to deal with a wide range of problems beyond those in the book. About the Author: Professor Ogunnaike is Interim Dean of Engineering at the University of Delaware. He is the recipient of the 2008 American Automatic Control Council's Control Engineering Practice

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Fundamentals of Queueing Networks

Probabilistic Foundations of Statistical Network Analysis

Probability, Random Processes, and Statistical Analysis