Probability Stochastic Processes And Queueing Theory

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Elements of Applied Stochastic Processes - U. Narayan Bhat 1984-10-25
Fundamentals of Queueing Theory, 2nd Edition Donald Gross and Carl M. Harris A graduate text and reference treating queueing theory from the development of standard models to applications. The emphasis is on real analysis of queueing systems, applications, and problem solving. It has been brought up-to-date by modernizing older treatments. 1985 (0 471-89067-7) 475 pp. Multivariate Descriptive Analysis Correspondence Analysis and Related Techniques for Large Matrices Ludovic Lebart, Alain Morineau and Kenneth M. Warwick Presents a set of statistical methods for exploratory analysis of large date sets and categorical data. This unique approach uses graphical aspects of multidimensional scaling techniques within the context of exploratory data analysis. 1984 (0 471-86743-8) 231 pp. Introduction to Linear Regression Analysis Douglas C. Montgomery and Elizabeth A. Peck A definitive introduction to linear regression analysis covering basic topics as well as recent approaches in the field. It blends theory and application in a way that enables readers to apply regression methodology in a variety of practical settings. Many detailed examples drawn directly from various fields of engineering, physical science, and the management sciences provide clear guidance to the use of the techniques. The interface with widely available computer programs for regression analysis is illustrated throughout with numerous actual computer printouts. 1982 (0 471-05850-5) 504 pp.
Probability, Random Processes, and Statistical Analysis - Hisashi Kobayashi 2011-12-15
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, 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 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.
Stochastic Processes - Alexander Zeifman 2019-12-12
The aim of this special issue is to publish original research papers that cover recent advances in the theory and application of stochastic processes. There is especial focus on applications of stochastic processes as models of dynamic phenomena in various research areas, such as queuing theory, physics, biology, economics, medicine, reliability theory, and financial mathematics. Potential topics include, but are not limited to: Markov chains and processes; large deviations and limit theorems; random motions; stochastic biological model; reliability, availability, maintenance, inspection; queueing models; queueing network models; computational methods for stochastic models; applications to risk theory, insurance and mathematical finance.
Introduction to Probability and Stochastic Processes with Applications - Liliana Blanco Castañeda 2014-08-21
An easily accessible, real-world approach to probability and stochastic processes Introduction to Probability and Stochastic Processes with Applications presents a clear, easy-to-understand treatment of probability and stochastic processes, providing readers with a solid foundation they can build upon throughout their careers. With an emphasis on applications in engineering, applied sciences, business and finance, statistics, mathematics, and operations research, the book features numerous real-world examples that illustrate how random phenomena occur in nature and how to use probabilistic techniques to accurately model these phenomena. The authors discuss a broad range of topics, from the basic concepts of probability to advanced topics for further study, including Itô integrals, martingales, and sigma algebras. Additional topical coverage includes: Distributions of discrete and continuous random variables frequently used in applications Random vectors, conditional probability, expectation, and multivariate normal distributions The laws of large numbers, limit theorems, and convergence of sequences of random variables Stochastic processes and related applications, particularly in queueing systems Financial mathematics, including pricing methods such as risk-neutral valuation and the Black-Scholes formula Extensive appendices containing a review of the requisite mathematics and tables of standard distributions for use in applications are provided, and plentiful exercises, problems, and solutions are found throughout. Also, a related website features additional exercises with solutions and supplementary material for classroom use. Introduction to Probability and Stochastic Processes with Applications is an ideal book for probability courses at the upper-undergraduate level. The book is also a valuable reference for researchers and practitioners in the fields of engineering, operations research, and computer science who conduct data analysis to make decisions in their everyday work.
Probability, Markov Chains, Queues, and Simulation - William J. Stewart 2009-07-06
Probability, Markov Chains, Queues, and Simulation provides a modern and authoritative treatment of the mathematical processes that underlie performance modeling. The detailed explanations of mathematical derivations and numerous illustrative examples make this textbook readily accessible to graduate and advanced undergraduate students taking courses in which stochastic processes play a fundamental role. The textbook is relevant to a wide variety of fields, including computer science, engineering, operations research, statistics, and mathematics. The textbook looks at the fundamentals of probability theory, from the basic concepts of set-based probability, through probability distributions, to bounds, limit theorems, and the laws of large numbers. Discrete and continuous-time Markov chains are analyzed from a theoretical and computational point of view. Topics include the Chapman-Kolmogorov equations; irreducibility; the potential, fundamental, and reachability matrices; random walk problems; reversibility; renewal processes; and the numerical computation of stationary and transient distributions. The M/M/1 queue and its extensions to more general birth-death processes are analyzed in detail, as are queues with phase-type arrival and service processes. The M/G/1 and G/M/1 queues are solved using embedded Markov chains; the busy period, residual service time, and priority scheduling are treated. Open and closed queueing networks are analyzed. The final part of the book addresses the mathematical basis of simulation. Each chapter of the textbook concludes with an extensive set of exercises. An instructor's solution manual, in which all exercises are completely worked out, is also available (to professors only). Numerous examples illuminate the mathematical theories Carefully detailed explanations of mathematical derivations guarantee a valuable pedagogical approach Each chapter concludes with an extensive set of exercises
Probability, Statistics and Queuing Theory - Sundarapandian 2009

General Stochastic Processes in the Theory of Queues - Vaclav E. Benes 2017-06-15
Mathematicians and engineers will appreciate this general, rigorous presentation of mathematical theory and understandable, practical account of applications. Topics include virtual delay, delay formulas, weak stationarity, weak Markov assumptions. 1963 edition.

Applied Probability and Stochastic Processes - V. C. Joshua 2020-08-29
This book gathers selected papers presented at the International Conference on Advances in Applied Probability and Stochastic Processes, held at CMS College, Kerala, India, on 7–10 January 2019. It showcases high-quality research conducted in the field of applied probability and stochastic processes by focusing on techniques for the modelling and analysis of systems evolving with time. Further, it discusses the applications of stochastic modelling in queuing theory, reliability, inventory, financial mathematics, operations research, and more. This book is intended for a broad audience, ranging from researchers interested in applied probability, stochastic modelling with reference to queuing theory, inventory, and reliability, to those working in industries such as communication and computer networks, distributed information systems, next-generation communication systems, intelligent transportation networks, and financial markets.

Level Crossing Methods in Stochastic Models - Percy H. Brill 2018-07-28
This is a complete update of the first edition of Level Crossing Methods in Stochastic Models, which was published in 2008. Level crossing methods are a set of sample-path based mathematical tools used in applied probability to establish reliable probability distributions. Since the basis for solving any applied probability problem requires a reliable probability distribution, Level Crossing Methods in Stochastic Models, Second Edition is a useful tool for all researchers working on stochastic application problems, including inventory control, queueing theory, reliability theory, actuarial ruin theory, renewal theory, pharmacokinetics, and related Markov processes. The second edition includes a new section with a novel derivation of the Beneš series for M/G/1 queues. It provides new results on the service time for three M/G/I queueing models with bounded workload. It analyzes new applications of queues where zero-wait customers get exceptional service, including several examples on M/G/1 queues, and a new section on G/M/1 queues. Additionally, there are two other important new sections: on the level-crossing derivation of the finite time-t probability distributions of excess, age, and total life, in renewal theory; and on a level-crossing analysis of a risk model in Insurance. The original Chapter 10 has been split into two chapters: the new chapter 10 is on renewal theory, and the first section of the new Chapter 11 is on a risk model. More explicit use is made of the renewal reward theorem throughout, and many technical and editorial changes have been made to facilitate readability. Percy H. Brill, Ph.D., is a Professor emeritus at the University of Windsor, Canada. Dr. Brill is the creator of the level crossing method for analyzing stochastic models. He has published extensively in stochastic processes, queueing theory and related models, especially using level crossing methods.

Delayed and Network Queues - Aliakbar Montazer Haghighi 2016-09-08
Presents an introduction to differential equations, probability, and stochastic processes with real-world applications of queues with delay and delayed network queues Featuring recent advances in queueing theory and modeling, Delayed and Network Queues provides the most up-to-date theories in queueing model applications. Balancing both theoretical and practical applications of queueing theory, the book introduces queueing network models as tools to assist in the answering of questions on cost and performance that arise throughout the life of a computer system and signal processing. Written by well-known researchers in the field, the book presents key information for understanding the essential aspects of queues with delay and networks of queues with unreliable nodes and vacationing servers. Beginning with simple analytical fundamentals, the book contains a selection of realistic and advanced queueing models that address current deficiencies. In addition, the book presents the treatment of queues with delay and networks of queues, including possible breakdowns and disruptions that may cause delay. Delayed and Network Queues also features: Numerous examples and exercises with applications in various fields of study such as mathematical sciences, biomathematics, engineering, physics, business, health industry, and economics A wide array of practical applications of network queues and queueing systems, all of which are related to the appropriate stochastic processes Up-to-date topical coverage such as single- and multiserver queues with and without delays, along with the necessary fundamental coverage of probability and difference equations Discussions on queueing models such as single- and multiserver Markovian queues with balking, reneging, delay, feedback, splitting, and blocking, as well as their role in the treatment of networks of queues with and without delay and network reliability Delayed and Network Queues is an excellent textbook for upper-undergraduate and graduate-level courses in applied mathematics, queueing theory, queueing systems, probability, and stochastic processes. The book is also an ideal reference for academics and practitioners in mathematical sciences, biomathematics, operations research, management, engineering, physics, business, economics, health industry, and industrial engineering. Aliakbar Montazer Haghighi, PhD, is Professor and Head of the Department of Mathematics at Prairie View A&M University, USA, as well as founding Editor-in-Chief of Applications and Applied Mathematics: An International Journal (AAM). His research interests include probability, statistics, stochastic processes, and queueing theory. Among his research publications and books, Dr. Haghighi is the coauthor of Difference and Differential Equations with Applications in Queueing Theory (Wiley, 2013). Dimitar P. Mishev, PhD, is Professor in the Department of Mathematics at Prairie View A&M University, USA. His research interests include differential and difference equations and queueing theory. The author of numerous research papers and three books, Dr. Mishev is the coauthor of Difference and Differential Equations with Applications in Queueing Theory (Wiley, 2013).

Stochastic Modeling and the Theory of Queues - Ronald W. Wolff 1989
An integrated and up-to-date treatment of applied stochastic processes and queueing theory, with an emphasis on time-averages and long-run behavior. Theory demonstrates practical effects, such as priorities, pooling of queues, and bottlenecks. Appropriate for senior/graduate courses in queueing theory in Operations Research, Computer Science, Statistics, or Industrial Engineering departments. (vs. Ross, Karlin, Kleinrock, Heyman)

Fundamentals of Probability and Stochastic Processes with Applications to Communications - Kun Il Park 2017-11-24
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 communications networks and systems, this book serves his/her need.

Difference and Differential Equations with Applications in Queueing Theory - Aliakbar Montazer Haghighi 2013-07-10
A Useful Guide to the Interrelated Areas of Differential Equations, Difference Equations, and Queueing Models Difference and Differential Equations with Applications in Queueing Theory presents the unique connections between the methods and applications of differential equations, difference equations, and Markovian queues. Featuring a comprehensive collection of topics that are used in stochastic processes, particularly in queueing theory, the book thoroughly discusses the relationship to systems of linear differential difference equations. The book demonstrates the applicability that queueing theory has in a variety of fields including telecommunications, traffic engineering, computing, and the design of factories, shops, offices, and hospitals. Along with the needed prerequisite fundamentals in probability, statistics, and Laplace transform, Difference and Differential Equations with Applications in Queueing Theory provides: A discussion on splitting, delayed-service, and delayed feedback for single-server, multiple-server, parallel, and series queue models Applications in queue models whose solutions require differential difference equations and generating function methods Exercises at the end of each chapter along with select answers The book is an excellent resource for researchers and practitioners in applied mathematics, operations research, engineering, and industrial engineering, as well as a useful text for upper-undergraduate and graduate-level courses in applied mathematics, differential and difference equations, queueing theory, probability, and stochastic processes.

Stochastic Processes 2 -

Essentials of Stochastic Processes - Richard Durrett 2016-11-07
Building upon the previous editions, this textbook is a first course in stochastic processes taken by undergraduate and graduate students (MS and PhD students from math, statistics, economics, computer science, engineering, and finance departments) who have had a course in probability theory. It covers Markov chains in discrete and continuous time, Poisson processes, renewal processes, martingales, and option pricing. One can only learn a subject by seeing it in action, so there are a large number of examples and more than 300 carefully chosen exercises to deepen the reader’s understanding. Drawing from teaching experience and student feedback, there are many new examples and problems with solutions that use TI-83 to eliminate the tedious details of solving linear equations by hand, and the collection of exercises is much improved, with many more biological examples. Originally included in previous editions, material too advanced for this first course in stochastic processes has been eliminated while treatment of other topics useful for applications has been expanded. In addition, the ordering of topics has been improved; for example, the difficult subject of martingales is delayed until its usefulness can be applied in the treatment of mathematical finance.
Probability, Random Variables, and Stochastic Processes - Athanasios Papoulis 1991

Stochastic Processes in Queueing Theory - Alexandr Borovkov 2012-12-06
The object of queueing theory (or the theory of mass service) is the investigation of stochastic processes of a special form which are called queueing (or service) processes in this book. Two approaches to the definition of these processes are possible depending on the direction of investigation. In accordance with this fact, the exposition of the subject can be broken up into two self-contained parts. The first of these forms the content of this monograph. . The definition of the queueing processes (systems) to be used here is dose to the traditional one and is connected with the introduction of so-called governing random sequences. We will introduce algorithms which describe the governing of a system with the aid of such sequences. Such a definition inevitably becomes rather qualitative since under these conditions a completely formal construction of a stochastic process uniquely describing the evolution of the system would require introduction of a complicated phase space not to mention the difficulties of giving the distribution of such a process on this phase space.
An Introduction to Queueing Theory - L. Breuer 2005-11-07
The present textbook contains the recordsof a two–semester course on que- ing theory, including an introduction to matrix–analytic methods. This course comprises four hours oflectures and two hours of exercises per week andhas been taughtattheUniversity of Trier, Germany, for about ten years in - quence. The course is directed to last year undergraduate and?rst year gr- uate students of applied probability and computer science, who have already completed an introduction to probability theory. Its purpose is to present - terial that is close enough to concrete queueing models and their applications, while providing a sound mathematical foundation for the analysis of these. Thus the goal of the present book is two–fold. On the one hand, students who are mainly interested in applications easily feel bored by elaborate mathematical questions in the theory of stochastic processes. The presentation of the mathematical foundations in our courses is chosen to cover only the necessary results, which are needed for a solid foundation of the methods of queueing analysis. Further, students oriented - wards applications expect to have a justi?cation for their mathematical efforts in terms of immediate use in queueing analysis. This is the main reason why we have decided to introduce new mathematical concepts only when they will be used in the immediate sequel. On the other hand, students of applied probability do not want any heur- tic derivations just for the sake of yielding fast results for the model at hand.
Probability, Stochastic Processes, and Queueing Theory - Randolph Nelson 1995-06-13
This textbook provides a comprehensive introduction to probability and stochastic processes, and shows how these subjects may be applied in computer performance modelling. The author's aim is to derive the theory in a way that combines its formal, intuitive, and applied aspects so that students may apply this indispensable tool in a variety of different settings. Readers are assumed to be familiar with elementary linear algebra and calculus, including the concept of limit, but otherwise this book provides a self-contained approach suitable for graduate or advanced undergraduate students. The first half of the book covers the basic concepts of probability including expectation, random variables, and fundamental theorems. In the second half of the book the reader is introduced to stochastic processes. Subjects covered include renewal processes, queueing theory, Markov processes, and reversibility as it applies to networks of queues. Examples and applications are drawn from problems in computer performance modelling.
Stochastic-Process Limits - Ward Whitt 2006-04-11
From the reviews: "The material is self-contained, but it is technical and a solid foundation in probability and queuing theory is beneficial to prospective readers. [... It] is intended to be accessible to those with less background. This book is a must to researchers and graduate students interested in these areas." ISI Short Book Reviews
Fundamentals of Probability - Saeed Ghahramani 2018-09-05
"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 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 sub-topic within a chapter is supplemented by a 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 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, 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 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, 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 Hopkins University and Towson University. His research focuses on applied probability, stochastic processes, and queuing theory.
Stochastic Networks and Queues - Philippe Robert 2013-04-17
Queues and stochastic networks are analyzed in this book with purely probabilistic methods. The purpose of these lectures is to show that general results from Markov processes, martingales or ergodic theory can be used directly to study the corresponding stochastic processes. Recent developments have shown that, instead of having ad-hoc methods, a better understanding of fundamental results on stochastic processes is crucial to study the complex behavior of stochastic networks. In this book, various aspects of these stochastic models are investigated in depth in an elementary way: Existence of equilibrium, characterization of stationary regimes, transient behaviors (rare events, hitting times) and critical regimes, etc. A simple presentation of stationary point processes and Palm measures is given. Scaling methods and

functional limit theorems are a major theme of this book. In particular, a complete chapter is devoted to fluid limits of Markov processes.

Stochastic Storage Processes - Narahari U. Prabhu 2012-12-06

This book is based on a course I have taught at Cornell University since 1965. The primary topic of this course was queueing theory, but related topics such as inventories, insurance risk, and dams were also included. As a text I used my earlier book, Queues and Inventories (John Wiley, New York, 1965). Over the years the emphasis in this course shifted from detailed analysis of probability models to the study of stochastic processes that arise from them, and the subtitle of the text, "A Study of Their Basic Stochastic Processes," became a more appropriate description of the course. My own research into the fluctuation theory for U:vy processes provided a new perspective on the topics discussed, and enabled me to reorganize the material. The lecture notes used for the course went through several versions, and the final version became this book. A detailed description of my approach will be found in the Introduction. I have not attempted to give credit to authors of individual results. Readers interested in the historical literature should consult the Selected Bibliography given at the end of the Introduction. The original work in this area is presented here with simpler proofs that make full use of the special features of the underlying stochastic processes. The same approach makes it possible to provide several new results. Thanks are due to Kathy King for her excellent typing of the manuscript.

An Introduction to Queueing Theory - U. Narayan Bhat 2015-07-09

This introductory textbook is designed for a one-semester course on queueing theory that does not require a course on stochastic processes as a prerequisite. By integrating the necessary background on stochastic processes with the analysis of models, the work provides a sound foundational introduction to the modeling and analysis of queueing systems for a broad interdisciplinary audience of students in mathematics, statistics, and applied disciplines such as computer science, operations research, and engineering. This edition includes additional topics in methodology and applications. Key features: • An introductory chapter including a historical account of the growth of queueing theory in more than 100 years. • A modeling-based approach with emphasis on identification of models • Rigorous treatment of the foundations of basic models commonly used in applications with appropriate references for advanced topics. • A chapter on matrix-analytic method as an alternative to the traditional methods of analysis of queueing systems. • A comprehensive treatment of statistical inference for queueing systems. • Modeling exercises and review exercises when appropriate. The second edition of An Introduction of Queueing Theory may be used as a textbook by first-year graduate students in fields such as computer science, operations research, industrial and systems engineering, as well as related fields such as manufacturing and communications engineering. Upper-level undergraduate students in mathematics, statistics, and engineering may also use the book in an introductory course on queueing theory. With its rigorous coverage of basic material and extensive bibliography of the queueing literature, the work may also be useful to applied scientists and practitioners as a self-study reference for applications and further research. "...This book has brought a freshness and novelty as it deals mainly with modeling and analysis in applications as well as with statistical inference for queueing problems. With his 40 years of valuable experience in teaching and high level research in this subject area, Professor Bhat has been able to achieve what he aimed: to make [the work] somewhat different in content and approach from other books." - Assam Statistical Review of the first edition

Probability and Statistics with Reliability, Queuing, and Computer Science Applications - Kishor S. Trivedi 2016-07-11

An accessible introduction to probability, stochastic processes, and statistics for computer science and engineering applications Second edition now also available in Paperback. This updated and revised edition of the popular classic first edition relates fundamental concepts in probability and statistics to the computer sciences and engineering. The author uses Markov chains and other statistical tools to illustrate processes in reliability of computer systems and networks, fault tolerance, and performance. This edition features an entirely new section on stochastic Petri nets—as well as new sections on system availability modeling, wireless system modeling, numerical solution techniques for Markov chains, and software reliability modeling, among other subjects. Extensive revisions take new developments in solution techniques and applications into account and bring this work totally up to date. It includes more than 200 worked examples and self-study exercises for each section. Probability and Statistics with Reliability, Queuing and Computer Science Applications, Second Edition offers a comprehensive introduction to probability, stochastic processes, and statistics for students of computer science, electrical and computer engineering, and applied mathematics. Its wealth of practical examples and up-to-date information makes it an excellent resource for practitioners as well. An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Stochastic Processes - Robert G. Gallager 2013-12-12

This definitive textbook provides a solid introduction to discrete and continuous stochastic processes, tackling a complex field in a way that instils a deep understanding of the relevant mathematical principles, and develops an intuitive grasp of the way these principles can be applied to modelling real-world systems. It includes a careful review of elementary probability and detailed coverage of Poisson, Gaussian and Markov processes with richly varied queuing applications. The theory and applications of inference, hypothesis testing, estimation, random walks, large deviations, martingales and investments are developed. Written by one of the world's leading information theorists, evolving over twenty years of graduate classroom teaching and enriched by over 300 exercises, this is an exceptional resource for anyone looking to develop their understanding of stochastic processes.

Probability Theory and Stochastic Processes - Pierre Brémaud 2020-04-07

The ultimate objective of this book is to present a panoramic view of the main stochastic processes which have an impact on applications, with complete proofs and exercises. Random processes play a central role in the applied sciences, including operations research, insurance, finance, biology, physics, computer and communications networks, and signal processing. In order to help the reader to reach a level of technical autonomy sufficient to understand the presented models, this book includes a reasonable dose of probability theory. On the other hand, the study of stochastic processes gives an opportunity to apply the main theoretical results of probability theory beyond classroom examples and in a non-trivial manner that makes this discipline look more attractive to the applications-oriented student. One can distinguish three parts of this book. The first four chapters are about probability theory, Chapters 5 to 8 concern random sequences, or discrete-time stochastic processes, and the rest of the book focuses on stochastic processes and point processes. There is sufficient modularity for the instructor or the self-teaching reader to design a course or a study program adapted to her/his specific needs. This book is in a large measure self-contained.

Probability, Statistics, and Queueing Theory - Arnold O. Allen 2014-06-28

This is a textbook on applied probability and statistics with computer science applications for students at the upper undergraduate level. It may also be used as a self study book for the practicing computer science professional. The successful first edition of this book proved extremely useful to students who need to use probability, statistics and queueing theory to solve problems in other fields, such as engineering, physics, operations research, and management science. The book has also been successfully used for courses in queueing theory for operations research students. This second edition includes a new chapter on regression as well as more than twice as many exercises at the end of each chapter. While the emphasis is the same as in the first edition, this new book makes more extensive use of available personal computer software, such as Minitab and Mathematica.

The Theory of Stochastic Processes - D.R. Cox 1977-02-01

The random walk; Markov chains; Markov processes with discrete states in continuous time; Markov processes in continuous time with continuous state space; Non-markovian processes; Stationary processes: time domain; Stationary processes: frequency domain; Point processes; Appendices; Index.

Applied Stochastic Processes - Mario Lefebvre 2007-12-14

This book uses a distinctly applied framework to present the most important topics in stochastic processes, including Gaussian and Markovian processes, Markov Chains, Poisson processes, Brownian motion and queueing theory. The book also examines in detail special diffusion processes, with implications for finance, various generalizations of Poisson processes, and renewal processes. It contains numerous examples and approximately 350 advanced problems that reinforce both concepts and applications. Entertaining mini-biographies of mathematicians give an enriching historical context. The book includes statistical tables and solutions to the even-numbered problems at the end.

Probability, Statistics, and Stochastic Processes - Peter Olofsson 2012-05-22

Praise for the First Edition ". . . an excellent textbook . . . well organized and neatly written." —Mathematical Reviews ". . . amazingly interesting . . ." —Technometrics Thoroughly updated to showcase the interrelationships between probability, statistics, and stochastic processes, Probability, Statistics, and Stochastic Processes, Second Edition prepares readers to collect, analyze, and characterize data in their chosen fields. Beginning with three chapters that develop probability theory and introduce the axioms of probability, random variables, and joint distributions, the book goes on to present limit theorems and simulation. The authors combine a rigorous, calculus-based development of theory with an intuitive approach that appeals to readers' sense of reason and logic. Including more than 400 examples that help illustrate concepts and theory, the Second Edition features new material on statistical inference and a wealth of newly added topics, including: Consistency of point estimators Large sample theory Bootstrap simulation Multiple hypothesis testing Fisher's exact test and Kolmogorov-Smirnov test Martingales, renewal processes, and Brownian motion One-way analysis of variance and the general linear model Extensively class-tested to ensure an accessible presentation, Probability, Statistics, and Stochastic Processes, Second Edition is an excellent book for courses on probability and statistics at the upper-undergraduate level. The book is also an ideal resource for scientists and engineers in the fields of statistics, mathematics, industrial management, and engineering.

Applied Probability and Stochastic Processes - Richard M. Feldman 2014-10-31

This book is a result of teaching stochastic processes to junior and senior undergr- uates and beginning graduate students over many years. In teaching such a course, we have realized a need to furnish students with material that gives a mathematical presentation while at the same time providing proper foundations to allow students to build an intuitive feel for probabilistic reasoning. We have tried to maintain a b- ance in presenting advanced but understandable material that sparks an interest and challenges students, without the discouragement that often comes as a consequence of not understanding the material. Our intent in this text is to develop stochastic p- cesses in an elementary but mathematically precise style and to provide suf?cient examples and homework exercises that will permit students to understand the range of application areas for stochastic processes. We also practice active learning in the classroom. In other words, we believe that the traditional practice of lecturing continuously for 50 to 75 minutes is not a very effective method for teaching. Students should somehow engage in the subject m- ter during the teaching session. One effective method for active learning is, after at most 20 minutes of lecture, to assign a small example problem for the students to work and one important tool that the instructor can utilize is the computer. So- times we are fortunate to lecture students in a classroom containing computers with a spreadsheet program, usually Microsoft's Excel.

Probability and Stochastic Processes - Roy D. Yates 2005

This user-friendly resource will help you grasp the concepts of probability and stochastic processes, so you can apply them in professional engineering practice. The book presents concepts clearly as a sequence of building blocks that are identified either as an axiom, definition, or theorem. This approach provides a better understanding of the material, which can be used to solve practical problems. Key Features: The text follows a single model that begins with an experiment consisting of a procedure and observations. The mathematics of discrete random variables appears separately from the mathematics of continuous random variables. Stochastic processes are introduced in Chapter 6, immediately after the presentation of discrete and continuous random variables. Subsequent material, including central limit theorem approximations, laws of large numbers, and statistical inference, then use examples that reinforce stochastic process concepts. An abundance of exercises are provided that help students learn how to put the theory to use.

Elements of Queueing Theory - Francois Baccelli 2002-12-10

This fundamental exposition of queueing theory, written by leading researchers, answers the need for a mathematically sound reference work on the subject and has become the standard reference. The thoroughly revised second edition contains a substantial number of exercises and their solutions, which makes the book suitable as a textbook.

Stochastic Processes in Queueing Theory - Alexander A. Borovkov 1976-03-08

Systems with queues and service of type one; Some boundary problems for processes continuous from below with independent increments. Their connection with the distribution of w(t); Boundary problems for sequences with independent increments and factorization identities; Properties of the supremum of sums of independent Random variables and related problems of queueing theory; Multi-channel queueing systems; The systems G, G, G/oo,1 with an infinite number of service channels; Systems with autonomous service.

Stochastic Models in Queueing Theory - Jyotiprasad Medhi 2002-11-06

This is a graduate level textbook that covers the fundamental topics in queuing theory. The book has a broad coverage of methods to calculate important probabilities, and gives attention to proving the general theorems. It includes many recent topics, such as server-vacation models, diffusion approximations and optimal operating policies, and more about bulk-arrival and bull-service models than other general texts. * Current, clear and comprehensive coverage * A wealth of interesting and relevant examples and exercises to reinforce concepts * Reference lists provided after each chapter for further investigation

Probability and Stochastic Processes - Roy D. Yates 2014-01-28

This text introduces engineering students to probability theory and stochastic processes. Along with thorough mathematical development of the subject, the book presents intuitive explanations of key points in order to give students the insights they need to apply math to practical engineering problems. The first seven chapters contain the core material that is essential to any introductory course. In one-semester undergraduate courses, instructors can select material from the remaining chapters to meet their individual goals. Graduate courses can cover all chapters in one semester.

A First Look At Stochastic Processes - Rosenthal Jeffrey S 2019-09-26

This textbook introduces the theory of stochastic processes, that is, randomness which proceeds in time. Using concrete examples like repeated gambling and jumping frogs, it presents fundamental mathematical results through simple, clear, logical theorems and examples. It covers in detail such essential material as Markov chain recurrence criteria, the Markov chain convergence theorem, and optional stopping theorems for martingales. The final chapter provides a brief introduction to Brownian motion, Markov processes in continuous time and space, Poisson processes, and renewal theory.Interspersed throughout are applications to such topics as gambler's ruin probabilities, random walks on graphs, sequence waiting times, branching processes, stock option pricing, and Markov Chain Monte Carlo (MCMC) algorithms.The focus is always on making the theory as well-motivated and accessible as possible, to allow students and readers to learn this fascinating subject as easily and painlessly as possible.

Fundamentals of Queueing Theory - John F. Shortle 2018-04-10

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 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 stochastic processes. This book is also a valuable reference for practitioners in applied mathematics, operations research, engineering, and industrial engineering.

Probability, Stochastic Processes, and Queueing Theory - Randolph Nelson 2013-06-29

We will occasionally footnote a portion of text with a "**,, to indicate Notes on the that this portion can be initially bypassed. The reasons for bypassing a Text portion of the text include: the subject is a special topic that will not be referenced later, the material can be skipped on first reading, or the level of mathematics is higher than the rest of the text. In cases where a topic is self-contained, we opt to collect the material into an appendix that can be read by students at their leisure. The material in the text cannot be fully assimilated until one makes it Notes on "their own" by applying the material to specific problems. Self-discovery Problems is the best teacher and although they are no substitute for an inquiring mind, problems that explore the subject from different viewpoints can often help the student to think about the material in a uniquely per sonal way. With this in mind, we have made problems an integral part of this work and have attempted to make them interesting as well as informative.