

Random Processes A Mathematical Approach For Engineers

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Introduction to Random Processes in Engineering - A. V. Balakrishnan 1995-11-23

Breaking with the traditional treatment of random processes in engineering On the surface, Introduction to Random Processes in Engineering is simply a first-rate textbook for senior or first-year graduate engineering courses in stochastic processes. A closer look, however, reveals an innovative book-rich with examples and commonsense explanations-that demystifies theories, eliminates ambiguities, and provides a solid, up-to-date introduction to this important subject. Departing from the classical texts of the sixties and seventies in its coverage of random signals and data processing, Introduction to Random Processes in Engineering addresses the latest advances in communication, control engineering, and signal processing by allowing all processes to be multidimensional with an emphasis on discrete-time processes and systems. Unlike current texts, this volume provides a strong mathematical perspective for its engineering topics without getting bogged down in technicalities. It employs mathematics to achieve clarity and precision, and at times even uses the theorem/proof style to emphasize mathematical fine points. This approach is particularly advantageous when dealing with random data, and when building an understanding of the many computer programs routinely used, its theoretical principles, and the results it generates. Assuming a senior-level background in probability theory and some acquaintance with linear systems and signals, the book provides: * A review chapter of the formulas used later in the book * Illustrative examples * Emphasis in simulation techniques * Problems accompanying each chapter that often introduce the student to other relevant material * Notes and comments following each chapter that encourage additional reading as well as historical explorations in the field * Tips for using the material at various levels of instruction With its logical and systematically ordered presentation of the material, as well as its fresh approach, Introduction to Random Processes in Engineering is both a superior textbook and a valuable reference for practicing engineers and researchers in the field.

Modeling Random Processes for Engineers and Managers - James J. Solberg 2008-12-22

By reducing mathematical detail and focusing on real-world applications, this book provides engineers with an easy-to-understand overview of stochastic modeling. An entire chapter is included on how to set up the problem, and then another complete chapter presents examples of applications before doing any math. A previously unpublished computational method for solving equations related to Markov processes is added. The book shows how to add costs or revenues to the basic probability structures without much additional effort. In addition, numerous examples are included that show how the theory can be used. Engineers will also find explanations on how to formulate word problems into the models that the math worked on.

Random Processes for Engineers - Bruce Hajek 2015-03-12

This engaging introduction to random processes provides students with the critical tools needed to design and evaluate engineering systems that must operate reliably in uncertain environments. A brief review of probability theory and real analysis of deterministic functions sets the stage for understanding random processes, whilst the underlying measure theoretic notions are explained in an intuitive, straightforward style. Students will learn to manage the complexity of randomness through the use of simple classes of random processes, statistical means and correlations, asymptotic analysis, sampling, and effective algorithms. Key topics covered include: • Calculus of random processes in linear systems • Kalman and Wiener filtering • Hidden Markov models for statistical

inference • The estimation maximization (EM) algorithm • An introduction to martingales and concentration inequalities. Understanding of the key concepts is reinforced through over 100 worked examples and 300 thoroughly tested homework problems (half of which are solved in detail at the end of the book).

Stochastic Calculus and Applications - Samuel N. Cohen 2015-11-18

Completely revised and greatly expanded, the new edition of this text takes readers who have been exposed to only basic courses in analysis through the modern general theory of random processes and stochastic integrals as used by systems theorists, electronic engineers and, more recently, those working in quantitative and mathematical finance. Building upon the original release of this title, this text will be of great interest to research mathematicians and graduate students working in those fields, as well as quants in the finance industry. New features of this edition include: End of chapter exercises; New chapters on basic measure theory and Backward SDEs; Reworked proofs, examples and explanatory material; Increased focus on motivating the mathematics; Extensive topical index. "Such a self-contained and complete exposition of stochastic calculus and applications fills an existing gap in the literature. The book can be recommended for first-year graduate studies. It will be useful for all who intend to work with stochastic calculus as well as with its applications."-Zentralblatt (from review of the First Edition)

An Introduction to Continuous-Time Stochastic Processes -

Vincenzo Capasso 2008-01-03

This concisely written book is a rigorous and self-contained introduction to the theory of continuous-time stochastic processes. Balancing theory and applications, the authors use stochastic methods and concrete examples to model real-world problems from engineering, biomathematics, biotechnology, and finance. Suitable as a textbook for graduate or advanced undergraduate courses, the work may also be used for self-study or as a reference. The book will be of interest to students, pure and applied mathematicians, and researchers or practitioners in mathematical finance, biomathematics, physics, and engineering.

Random Processes - Robert M. Gray 1986

Probability, Random Processes, and Estimation Theory for Engineers - Henry Stark 1994

Disk contains: BASIC and MATLAB demonstration programs.

Probability and Random Processes for Electrical Engineers - Yannis Viniotis 1998

This book introduces the fundamentals of probability theory and random processes by demonstrating its application to real-world engineering problems. It connects theory and practice through an emphasis on mathematical modeling and promotes a hands-on approach to the subject. At every step of theoretical development, the student is invited to challenge the theory by asking "what-if" questions. Specially written Matlab programs, which are available at the text's Web site, encourage real data experimentation and facilitate the visual modeling of difficult probabilistic concepts. The modeling tools are clearly identified in every chapter and are accompanied by discussions of the applicability, power, and limitations of each tool. It is ideally suited for advanced undergraduates and graduate students in electrical and computer engineering.

Stochastic Processes in Mathematical Physics and Engineering - Richard Bellman 1964

Probability and Random Processes - A. Bruce Clarke 1991-01-16

A comprehensive textbook for undergraduate courses in introductory

probability. Offers a case study approach, with examples from engineering and the social and life sciences. Updated second edition includes advanced material on stochastic processes. Suitable for junior and senior level courses in industrial engineering, mathematics, business, biology, and social science departments.

Probability and Random Processes - Venkatarama Krishnan
2006-06-27

A resource for probability AND random processes, with hundreds of worked examples and probability and Fourier transform tables. This survival guide in probability and random processes eliminates the need to pore through several resources to find a certain formula or table. It offers a compendium of most distribution functions used by communication engineers, queuing theory specialists, signal processing engineers, biomedical engineers, physicists, and students. Key topics covered include: * Random variables and most of their frequently used discrete and continuous probability distribution functions * Moments, transformations, and convergences of random variables * Characteristic, generating, and moment-generating functions * Computer generation of random variates * Estimation theory and the associated orthogonality principle * Linear vector spaces and matrix theory with vector and matrix differentiation concepts * Vector random variables * Random processes and stationarity concepts * Extensive classification of random processes * Random processes through linear systems and the associated Wiener and Kalman filters * Application of probability in single photon emission tomography (SPECT). More than 400 figures drawn to scale assist readers in understanding and applying theory. Many of these figures accompany the more than 300 examples given to help readers visualize how to solve the problem at hand. In many instances, worked examples are resolved with more than one approach to illustrate how different probability methodologies can work for the same problem.

Several probability tables with accuracy up to nine decimal places are provided in the appendices for quick reference. A special feature is the graphical presentation of the commonly occurring Fourier transforms, where both time and frequency functions are drawn to scale. This book is of particular value to undergraduate and graduate students in electrical, computer, and civil engineering, as well as students in physics and applied mathematics. Engineers, computer scientists, biostatisticians, and researchers in communications will also benefit from having a single resource to address most issues in probability and random processes.

Introduction to Random Processes in Engineering - A. V. Balakrishnan
2005-06-09

Breaking with the traditional treatment of random processes in engineering. On the surface, Introduction to Random Processes in Engineering is simply a first-rate textbook for senior or first-year graduate engineering courses in stochastic processes. A closer look, however, reveals an innovative book—rich with examples and commonsense explanations—that demystifies theories, eliminates ambiguities, and provides a solid, up-to-date introduction to this important subject. Departing from the classical texts of the sixties and seventies in its coverage of random signals and data processing, Introduction to Random Processes in Engineering addresses the latest advances in communication, control engineering, and signal processing by allowing all processes to be multidimensional with an emphasis on discrete-time processes and systems. Unlike current texts, this volume provides a strong mathematical perspective for its engineering topics without getting bogged down in technicalities. It employs mathematics to achieve clarity and precision, and at times even uses the theorem/proof style to emphasize mathematical fine points. This approach is particularly advantageous when dealing with random data, and when building an understanding of the many computer programs routinely used, its theoretical principles, and the results it generates. Assuming a senior-level background in probability theory and some acquaintance with linear systems and signals, the book provides: A review chapter of the formulas used later in the book. Illustrative examples. Emphasis in simulation techniques. Problems accompanying each chapter that often introduce the student to other relevant material. Notes and comments following each chapter that encourage additional reading as well as historical explorations in the field. Tips for using the material at various levels of instruction. With its logical and systematically ordered presentation of the material, as well as its fresh approach, Introduction to Random Processes in Engineering is both a superior textbook and a valuable reference for practicing engineers and researchers in the field.

Stochastic Tools in Turbulence - John L. Lumey 2012-12-02

Stochastic Tools in Turbulence discusses the available mathematical tools to describe stochastic vector fields to solve problems related to these

fields. The book deals with the needs of turbulence in relation to stochastic vector fields, particularly, on three-dimensional aspects, linear problems, and stochastic model building. The text describes probability distributions and densities, including Lebesgue integration, conditional probabilities, conditional expectations, statistical independence, lack of correlation. The book also explains the significance of the moments, the properties of the characteristic function, and the Gaussian distribution from a more physical point of view. In considering fields, one must account for single-valued functions of one or more parameters, or collections of single-valued functions of one or more parameters such as time or space coordinates. The text also discusses multidimensional vector fields of finite energy, the characteristic eddies for a homogeneous vector field, as well as, the distribution of solutions of an algebraic equation. Engineers, algebra students, and professors of statistics and advanced mathematics will find the book highly useful.

Models of Random Processes - Igor N. Kovalenko 1996-07-08

Devising and investigating random processes that describe mathematical models of phenomena is a major aspect of probability theory applications. Stochastic methods have penetrated into an unimaginably wide scope of problems encountered by researchers who need stochastic methods to solve problems and further their studies. This handbook supplies the knowledge you need on the modern theory of random processes. Packed with methods, Models of Random Processes: A Handbook for Mathematicians and Engineers presents definitions and properties on such widespread processes as Poisson, Markov, semi-Markov, Gaussian, and branching processes, and on special processes such as cluster, self-exciting, double stochastic Poisson, Gauss-Poisson, and extremal processes occurring in a variety of different practical problems. The handbook is based on an axiomatic definition of probability space, with strict definitions and constructions of random processes. Emphasis is placed on the constructive definition of each class of random processes, so that a process is explicitly defined by a sequence of independent random variables and can easily be implemented into the modelling. Models of Random Processes: A Handbook for Mathematicians and Engineers will be useful to researchers, engineers, postgraduate students and teachers in the fields of mathematics, physics, engineering, operations research, system analysis, econometrics, and many others.

Basic Probability Theory for Biomedical Engineers - John Enderle
2022-05-31

This is the first in a series of short books on probability theory and random processes for biomedical engineers. This text is written as an introduction to probability theory. The goal was to prepare students, engineers and scientists at all levels of background and experience for the application of this theory to a wide variety of problems—as well as pursue these topics at a more advanced level. The approach is to present a unified treatment of the subject. There are only a few key concepts involved in the basic theory of probability theory. These key concepts are all presented in the first chapter. The second chapter introduces the topic of random variables. Later chapters simply expand upon these key ideas and extend the range of application. A considerable effort has been made to develop the theory in a logical manner—developing special mathematical skills as needed. The mathematical background required of the reader is basic knowledge of differential calculus. Every effort has been made to be consistent with commonly used notation and terminology—both within the engineering community as well as the probability and statistics literature. Biomedical engineering examples are introduced throughout the text and a large number of self-study problems are available for the reader.

Probability and Random Processes for Electrical and Computer Engineers - Charles Therrien 2018-09-03

With updates and enhancements to the incredibly successful first edition, Probability and Random Processes for Electrical and Computer Engineers, Second Edition retains the best aspects of the original but offers an even more potent introduction to probability and random variables and processes. Written in a clear, concise style that illustrates the subject's relevance to a wide range of areas in engineering and physical and computer sciences, this text is organized into two parts. The first focuses on the probability model, random variables and transformations, and inequalities and limit theorems. The second deals with several types of random processes and queuing theory. New or Updated for the Second Edition: A short new chapter on random vectors that adds some advanced new material and supports topics associated with discrete random processes. Reorganized chapters that further clarify topics such as random processes (including Markov and Poisson) and analysis in the time and frequency domain. A large collection of new MATLAB®-based problems and computer projects/assignments. Each Chapter Contains at Least Two

Computer Assignments Maintaining the simplified, intuitive style that proved effective the first time, this edition integrates corrections and improvements based on feedback from students and teachers. Focused on strengthening the reader's grasp of underlying mathematical concepts, the book combines an abundance of practical applications, examples, and other tools to simplify unnecessarily difficult solutions to varying engineering problems in communications, signal processing, networks, and associated fields.

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.

Probability and Random Processes for Electrical and Computer Engineers - John A. Gubner 2006-06-01

The theory of probability is a powerful tool that helps electrical and computer engineers to explain, model, analyze, and design the technology they develop. The text begins at the advanced undergraduate level, assuming only a modest knowledge of probability, and progresses through more complex topics mastered at graduate level. The first five chapters cover the basics of probability and both discrete and continuous random variables. The later chapters have a more specialized coverage, including random vectors, Gaussian random vectors, random processes, Markov Chains, and convergence. Describing tools and results that are used extensively in the field, this is more than a textbook; it is also a reference for researchers working in communications, signal processing, and computer network traffic analysis. With over 300 worked examples, some 800 homework problems, and sections for exam preparation, this is an essential companion for advanced undergraduate and graduate students. Further resources for this title, including solutions (for Instructors only), are available online at www.cambridge.org/9780521864701.

Probability and Random Processes for Electrical Engineering - Alberto Leon-Garcia 1994-09

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.

Discrete Stochastic Processes - Robert G. Gallager 2012-12-06

Stochastic processes are found in probabilistic systems that evolve with

time. Discrete stochastic processes change by only integer time steps (for some time scale), or are characterized by discrete occurrences at arbitrary times. *Discrete Stochastic Processes* helps the reader develop the understanding and intuition necessary to apply stochastic process theory in engineering, science and operations research. The book approaches the subject via many simple examples which build insight into the structure of stochastic processes and the general effect of these phenomena in real systems. The book presents mathematical ideas without recourse to measure theory, using only minimal mathematical analysis. In the proofs and explanations, clarity is favored over formal rigor, and simplicity over generality. Numerous examples are given to show how results fail to hold when all the conditions are not satisfied.

Audience: An excellent textbook for a graduate level course in engineering and operations research. Also an invaluable reference for all those requiring a deeper understanding of the subject.

Probability, Statistics, and Random Processes for Electrical Engineering - Alberto Leon-Garcia 2008

While helping students to develop their problem-solving skills, the author motivates students with practical applications from various areas of ECE that demonstrate the relevance of probability theory to engineering practice.

Random Processes for Engineers - Arthur David Snider 2017-01-27

This book offers an intuitive approach to random processes and educates the reader on how to interpret and predict their behavior. Premised on the idea that new techniques are best introduced by specific, low-dimensional examples, the mathematical exposition is easier to comprehend and more enjoyable, and it motivates the subsequent generalizations. It distinguishes between the science of extracting statistical information from raw data--e.g., a time series about which nothing is known a priori--and that of analyzing specific statistical models, such as Bernoulli trials, Poisson queues, ARMA, and Markov processes. The former motivates the concepts of statistical spectral analysis (such as the Wiener-Khinchine theory), and the latter applies and interprets them in specific physical contexts. The formidable Kalman filter is introduced in a simple scalar context, where its basic strategy is transparent, and gradually extended to the full-blown iterative matrix form.

Introduction to Probability, Statistics, and Random Processes - Hossein Pishro-Nik 2014-08-15

The book covers basic concepts such as random experiments, probability axioms, conditional probability, and counting methods, single and multiple random variables (discrete, continuous, and mixed), as well as moment-generating functions, characteristic functions, random vectors, and inequalities; limit theorems and convergence; introduction to Bayesian and classical statistics; random processes including processing of random signals, Poisson processes, discrete-time and continuous-time Markov chains, and Brownian motion; simulation using MATLAB and R.

Selected Papers on Noise and Stochastic Processes - Nelson Wax 2014-08-20

Six classic papers, selected to meet the needs of physicists, applied mathematicians, and engineers, include contributions by S. Chandrasekhar, G. E. Uhlenbeck, L. S. Ornstein, Ming Chen Wang, others. 1954 edition.

Probability, Statistics, and Random Processes for Engineers - Henry Stark 2012

For courses in Probability and Random Processes. *Probability, Statistics, and Random Processes for Engineers, 4e* is a comprehensive treatment of probability and random processes that, more than any other available source, combines rigor with accessibility. Beginning with the fundamentals of probability theory and requiring only college-level calculus, the book develops all the tools needed to understand more advanced topics such as random sequences, continuous-time random processes, and statistical signal processing. The book progresses at a leisurely pace, never assuming more knowledge than contained in the material already covered. Rigor is established by developing all results from the basic axioms and carefully defining and discussing such advanced notions as stochastic convergence, stochastic integrals and resolution of stochastic processes.

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.

Intermediate Probability Theory for Biomedical Engineers - John Enderle 2022-06-01

This is the second in a series of three short books on probability theory and random processes for biomedical engineers. This volume focuses on expectation, standard deviation, moments, and the characteristic function. In addition, conditional expectation, conditional moments and the conditional characteristic function are also discussed. Jointly distributed random variables are described, along with joint expectation, joint moments, and the joint characteristic function. Convolution is also developed. A considerable effort has been made to develop the theory in a logical manner—developing special mathematical skills as needed. The mathematical background required of the reader is basic knowledge of differential calculus. Every effort has been made to be consistent with commonly used notation and terminology—both within the engineering community as well as the probability and statistics literature. The aim is to prepare students for the application of this theory to a wide variety of problems, as well give practicing engineers and researchers a tool to pursue these topics at a more advanced level. Pertinent biomedical engineering examples are used throughout the text.

Probability and Random Processes - Wilbur B. Davenport 1977

Stochastic Processes - Kaddour Najim 2004-07-01

A 'stochastic' process is a 'random' or 'conjectural' process, and this book is concerned with applied probability and statistics. Whilst maintaining the mathematical rigour this subject requires, it addresses topics of interest to engineers, such as problems in modelling, control, reliability maintenance, data analysis and engineering involvement with insurance. This book deals with the tools and techniques used in the stochastic process - estimation, optimisation and recursive logarithms - in a form accessible to engineers and which can also be applied to Matlab. Amongst the themes covered in the chapters are mathematical expectation arising from increasing information patterns, the estimation of probability distribution, the treatment of distribution of real random phenomena (in engineering, economics, biology and medicine etc), and expectation maximisation. The latter part of the book considers optimization algorithms, which can be used, for example, to help in the better utilization of resources, and stochastic approximation algorithms, which can provide prototype models in many practical applications. * An engineering approach to applied probabilities and statistics * Presents examples related to practical engineering applications, such as reliability, randomness and use of resources * Readers with varying interests and mathematical backgrounds will find this book accessible

Stochastic Processes in Mathematical Physics and Engineering - Richard Ernest Bellman 1964-12-31

Probability, Random Processes, and Ergodic Properties - Robert M. Gray 2013-04-18

This book has been written for several reasons, not all of which are academic. This material was for many years the first half of a book in progress on information and ergodic theory. The intent was and is to provide a reasonably self-contained advanced treatment of measure theory, probability theory, and the theory of discrete time random processes with an emphasis on general alphabets and on ergodic and stationary properties of random processes that might be neither ergodic nor stationary. The intended audience was mathematically inclined engineering graduate students and visiting scholars who had not had formal courses in measure theoretic probability. Much of the material is familiar stuff for mathematicians, but many of the topics and results have not previously appeared in books. The original project grew too large and the first part contained much that would likely bore mathematicians and discourage them from the second part. Hence I finally followed the suggestion to separate the material and split the project in two. The original justification for the present manuscript was the pragmatic one that it would be a shame to waste all the effort thus far expended. A more idealistic motivation was that the presentation had merit as filling a unique, albeit small, hole in the literature.

High-Dimensional Probability - Roman Vershynin 2018-09-30

High-dimensional probability offers insight into the behavior of random vectors, random matrices, random subspaces, and objects used to quantify uncertainty in high dimensions. Drawing on ideas from probability, analysis, and geometry, it lends itself to applications in mathematics, statistics, theoretical computer science, signal processing, optimization, and more. It is the first to integrate theory, key tools, and

modern applications of high-dimensional probability. Concentration inequalities form the core, and it covers both classical results such as Hoeffding's and Chernoff's inequalities and modern developments such as the matrix Bernstein's inequality. It then introduces the powerful methods based on stochastic processes, including such tools as Slepian's, Sudakov's, and Dudley's inequalities, as well as generic chaining and bounds based on VC dimension. A broad range of illustrations is embedded throughout, including classical and modern results for covariance estimation, clustering, networks, semidefinite programming, coding, dimension reduction, matrix completion, machine learning, compressed sensing, and sparse regression.

Random Signal Analysis in Engineering Systems - John Komo 1987-01-01

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.

Intuitive Probability and Random Processes using MATLAB® - Steven Kay 2017-04-30

Intuitive Probability and Random Processes using MATLAB® is an introduction to probability and random processes that merges theory with practice. Based on the author's belief that only "hands-on" experience with the material can promote intuitive understanding, the approach is to motivate the need for theory using MATLAB examples, followed by theory and analysis, and finally descriptions of "real-world" examples to acquaint the reader with a wide variety of applications. The latter is intended to answer the usual question "Why do we have to study this?" Other salient features are: *heavy reliance on computer simulation for illustration and student exercises *the incorporation of MATLAB programs and code segments *discussion of discrete random variables followed by continuous random variables to minimize confusion *summary sections at the beginning of each chapter *in-line equation explanations *warnings on common errors and pitfalls *over 750 problems designed to help the reader assimilate and extend the concepts Intuitive Probability and Random Processes using MATLAB® is intended for undergraduate and first-year graduate students in engineering. The practicing engineer as well as others having the appropriate mathematical background will also benefit from this book. About the Author Steven M. Kay is a Professor of Electrical Engineering at the University of Rhode Island and a leading expert in signal processing. He has received the Education Award "for outstanding contributions in education and in writing scholarly books and texts..." from the IEEE Signal Processing society and has been listed as among the 250 most cited researchers in the world in engineering.

Random Perturbation Methods with Applications in Science and Engineering - Anatoli V. Skorokhod 2007-06-21

This book develops methods for describing random dynamical systems, and it illustrates how the methods can be used in a variety of applications. Appeals to researchers and graduate students who require tools to investigate stochastic systems.

Probability and Random Processes for Electrical Engineering - Alberto Leon-Garcia 1993-12

Probability, Random Variables, and Random Processes - John J. Shynk 2012-10-15

Probability, Random Variables, and Random Processes is a comprehensive textbook on probability theory for engineers that provides a more rigorous mathematical framework than is usually encountered in undergraduate courses. It is intended for first-year graduate students who have some familiarity with probability and random variables, though not necessarily of random processes and systems that operate on random signals. It is also appropriate for advanced undergraduate students who have a strong mathematical background. The book has the following features: Several appendices include related material on integration, important inequalities and identities, frequency-domain transforms, and linear algebra. These topics have been included so that the book is relatively self-contained.

One appendix contains an extensive summary of 33 random variables and their properties such as moments, characteristic functions, and entropy. Unlike most books on probability, numerous figures have been included to clarify and expand upon important points. Over 600 illustrations and MATLAB plots have been designed to reinforce the material and illustrate the various characterizations and properties of random quantities. Sufficient statistics are covered in detail, as is their connection to parameter estimation techniques. These include classical Bayesian estimation and several optimality criteria: mean-square error, mean-absolute error, maximum likelihood, method of moments, and least squares. The last four chapters provide an introduction to several topics usually studied in subsequent engineering courses: communication systems and information theory; optimal filtering (Wiener and Kalman); adaptive filtering (FIR and IIR); and antenna beamforming, channel equalization, and direction finding. This material is available electronically at the companion website. Probability, Random Variables, and Random Processes is the only textbook on probability for engineers that includes relevant background material, provides extensive summaries of key results, and extends various statistical techniques to a range of applications in signal processing.

Stationary Stochastic Processes - Georg Lindgren 2012-10-01

Intended for a second course in stationary processes, *Stationary Stochastic Processes: Theory and Applications* presents the theory behind the field's widely scattered applications in engineering and science. In addition, it reviews sample function properties and spectral representations for stationary processes and fields, including a portion on stationary point processes. Features Presents and illustrates the fundamental correlation and spectral methods for stochastic processes and random fields Explains how the basic theory is used in special applications like detection theory and signal processing, spatial statistics, and reliability Motivates mathematical theory from a statistical model-building viewpoint Introduces a selection of special topics, including extreme value theory, filter theory, long-range dependence, and point processes Provides more than 100 exercises with hints to solutions and selected full solutions This book covers key topics such as ergodicity, crossing problems, and extremes, and opens the doors to a selection of special topics, like extreme value theory, filter theory, long-range dependence, and point processes, and includes many exercises and examples to illustrate the theory. Precise in mathematical details without being pedantic, *Stationary Stochastic Processes: Theory and Applications* is for the student with some experience with stochastic processes and a desire for deeper understanding without getting bogged down in abstract mathematics.