

Probability, Random Processes, and Statistical Analysis: Applications to Communications, Signal Processing, Queueing Theory and Mathematical Finance

By Hisashi Kobayashi, Brian L. Mark, William Turin

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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, queueing and loss networks, and 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. Professor Hisashi Kobayashi discusses the book:

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Editorial Review

Review
"This book provides a very comprehensive, well-written and modern approach to the fundamentals of probability and random processes, together with their applications in the statistical analysis of data and signals. It provides a one-stop, unified treatment that gives the reader an understanding of the models, methodologies and underlying principles behind many of the most important statistical problems arising in engineering and the sciences today." - Dean H. Vincent Poor, Princeton University

"This is a well-written up-to-date graduate text on probabilty and random processes. It is unique in combining statistical analysis with the probabilistic material. As noted by the authors, the material, as presented, can be used in a variety of current application areas, ranging from communications to bioinformatics. I particularly liked the historical introduction, which should make the field exciting to the student, as well as the introductory chapter on probability, which clearly describes for the student the distinction between the relative frequency and axiomatic approaches to probability. I recommend it unhesitatingly. It deserves to become a leading text in the field." - Mischa Schwartz, Professor Emeritus, Columbia University

"Hisashi Kobayashi, Brian L. Mark, and William Turin are highly experienced university teachers and scientists. Based on this background their book covers not only fundamentals but also a large range of applications. Some of them are treated in a textbook for the first time. Without any doubt the book will be extremely valuable to graduate students and to scientists in universities and industry as well. Congratulations to the authors!" - Prof. Dr.-Ing. Eberhard Hänsler, Technische Universität Darmstadt

"An up-to-date and comprehensive book with all the fundamentals in Probability, Random Processes, Stochastic Analysis, and their interplays and applications, which lays a solid foundation for the students in related areas. It is also an ideal textbook with five relatively independent but logically interconnected parts and the corresponding solution manuals and lecture slides. Furthermore, to my best knowledge, the similar editing in Part IV and Part V can't be found elsewhere." - Zhisheng Niu, Tsinghua University

"authors have provided a much welcome textbook to our community in the large. The book will be useful to students and researchers in areas as diverse as communications, networks, signal processing, bioinformatics, and econometrics. Given the lucid style of exposition and the readily available online supplementing resources, it is very likely that this text will see its popularity in classroom teaching. I have one copy already, and plan to buy another." - Ou Zhao, Mathematical Reviews

About the Author
Hisashi Kobayashi is the Sherman Fairchild University Professor Emeritus at Princeton University, where he was previously Dean of the School of Engineering and Applied Science. He also spent 15 years at the IBM Research Center, Yorktown Heights, NY, and was the Founding Director of the IBM Tokyo Research Laboratory. He is an IEEE Life Fellow, an IEICE Fellow, was elected to the Engineering Academy of Japan (1992) and received the 2005 Eduard Rhein Technology Award.

Brian L. Mark is a Professor in the Department of Electrical and Computer Engineering at George Mason University. Prior to this, he was a Research Staff Member at the NEC C&C Research Laboratories in

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William Turin is currently a Consultant at AT&T Labs Research. As a Member of Technical Staff at AT&T Bell Laboratories and later a Technology Consultant at AT&T Labs Research for 21 years, he developed methods for qualifying the performance of communication systems. He is the author of six books and numerous papers.

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