

An Introduction to Applied Probability

This book provides the elements of probability and stochastic processes of direct interest to the applied sciences where probabilistic models play an important role, most notably in the information and communications sciences, computer sciences, operations research, and electrical engineering, but also in fields like epidemiology, biology, ecology, physics, and the earth sciences.

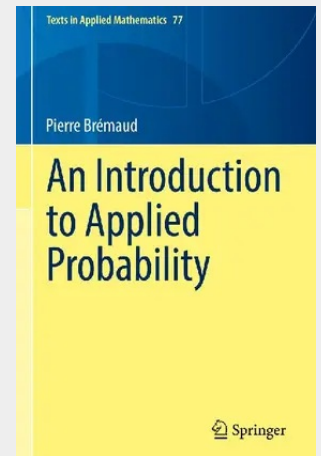
The theoretical tools are presented gradually, not deterring the readers with a wall of technicalities before they have the opportunity to understand their relevance in simple situations. In particular, the use of the so-called modern integration theory (the Lebesgue integral) is postponed until the fifth chapter, where it is reviewed in sufficient detail for a rigorous treatment of the topics of interest in the various domains of application listed above.

The treatment, while mathematical, maintains a balance between depth and accessibility that is suitable for the efficient manipulation, based on solid theoretical foundations, of the four most important and ubiquitous categories of probabilistic models:

- Markov chains, which are omnipresent and versatile models in applied probability
- Poisson processes (on the line and in space), occurring in a range of applications from ecology to queuing and mobile communications networks
- Brownian motion, which models fluctuations in the stock market and the "white noise" of physics
- Wide-sense stationary processes, of special importance in signal analysis and design, as well as in the earth sciences.

This book can be used as a text in various ways and at different levels of study. Essentially, it provides the material for a two-semester graduate course on probability and stochastic processes in a department of applied mathematics or for students in departments where stochastic models play an essential role. The progressive introduction of concepts and tools, along with the inclusion of numerous examples, also makes this book well-adapted for self-study.

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