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Probability and measure theory. 2nd ed. (English) Zbl 0944.60004
San Diego, FL: Academic Press (ISBN 0-12-065202-1). xii, 516 p. (2000).

From the authors' preface: Chapters 1 and 2 develop the fundamentals of measure and integration theory. Included are several results that are crucial in constructing the foundations of probability, the Radon-Nikodým theorem, product measure theorem, the Kolmogorov extension theorem and the theory of weak convergence of measures. Those who wish to reach probability as quickly as possible may omit Chapter 3, which gives a brief introduction to functional analysis, and Section 2.3, which gives some applications to real analysis.

The study of probability begins with Chapter 4, which offers a summary of an undergraduate probability course from a measure-theoretical point of view. Chapter 5 is concerned with the general concept of conditional probability and expectation. The approach to problems that involve conditioning, given events of probability zero, is the gateway to many areas of probability theory. Chapter 6 deals with strong laws of large numbers, first from the classical viewpoint, and then via martingale theory. Basic properties and applications of martingale sequences are developed systematically. Chapter 7 considers the central limit problem, emphasizing the fundamental role of Prokhorov's weak compactness theorem. The last two sections of this chapter cover some material (not in the first edition) of special interest to statisticians: Slutsky's theorem, the Skorokhod construction, convergence of transformed sequences and a k -dimensional central limit theorem.

Chapters 8 and 9 have been added in the second edition, and should be of interest to the entire prospective audience: mathematicians, statisticians, and engineers. Chapter 8 covers ergodic theory, which is developed far enough so that connections with information theory are clearly visible. The Shannon-McMillan theorem is proved and the isomorphism problem for Bernoulli shifts is discussed. Chapter 9 treats the one-dimensional Brownian motion in details, and then introduces integrals and the Itô differentiation formula.

For the 1st edition see [\[Zbl 1381.28001\]](#).

Reviewer: D.Plachky (Münster)

MSC:

- [60-01](#) Introductory exposition (textbooks, tutorial papers, etc.) pertaining to probability theory
- [60A10](#) Probabilistic measure theory

Cited in 1 Review Cited in 69 Documents
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Keywords:

[Brownian motion](#); [central limit problem](#); [martingale theory](#)