

**ZMATH 2012d.00528**

**Durrett, Rick**

**Essentials of stochastic processes.**

Springer Texts in Statistics. New York, NY: Springer. 281 p. (1999).

This book gives an introduction to stochastic processes for students in mathematics and other disciplines. It uses no measure theory and the emphasis is more on conveying the intuition why results are true than on giving proofs for every result. After a short review of basic probability concepts, there are six chapters each containing plenty of exercises. First come 70 pages presenting the standard results on discrete time Markov chains with discrete state space. Next is a 25 page account of martingales in discrete time, giving essentially the stopping theorem and some applications. Poisson processes are treated on 30 pages; topics include thinning, conditioning and spatial processes among others. Continuous-time Markov chains take up the next 50 pages; the main applications here are to find equilibrium distributions for a number of open and closed queueing networks. Renewal theory on 30 pages presents the law of large numbers and applications to queueing; most results here are explained intuitively, but not proved fully. The final 30 pages give a brief account of Brownian motion and more precisely some applications of the strong Markov property and martingales to hitting and exit times. With its main focus on applications and intuition, this book will be useful for students and to teach a course for an application-oriented audience. *M. Schweizer (Berlin)*

*Classification:* K65

*Keywords:* Markov chains; Poisson process; renewal processes; martingales