

Stochastic Processes and Financial Mathematics

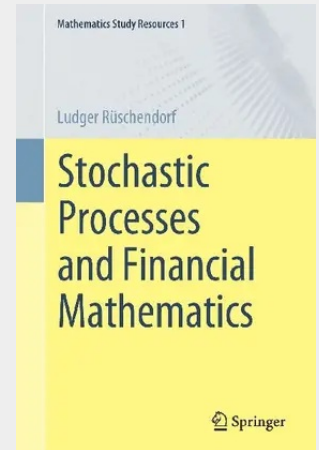
The book provides an introduction to advanced topics in stochastic processes and related stochastic analysis, and combines them with a sound presentation of the fundamentals of financial mathematics. It is wide-ranging in content, while at the same time placing much emphasis on good readability, motivation, and explanation of the issues covered.

Financial mathematical topics are first introduced in the context of discrete time processes and then transferred to continuous-time models. The basic construction of the stochastic integral and the associated martingale theory provide fundamental methods of the theory of stochastic processes for the construction of suitable stochastic models of financial mathematics, e.g. using stochastic differential equations. Central results of stochastic analysis such as the Itô formula, Girsanov's theorem and martingale representation theorems are of fundamental importance in financial mathematics, e.g. for the risk-neutral valuation formula (Black-Scholes formula) or the question of the hedgeability of options and the completeness of market models. Chapters on the valuation of options in complete and incomplete markets and on the determination of optimal hedging strategies conclude the range of topics.

Advanced knowledge of probability theory is assumed, in particular of discrete-time processes (martingales, Markov chains) and continuous-time processes (Brownian motion, Lévy processes, processes with independent increments, Markov processes). The book is thus suitable for advanced students as a companion reading and for instructors as a basis for their own courses.

This book is a translation of the original German 1st edition *Stochastische Prozesse und Finanzmathematik* by Ludger Rüschendorf, published by Springer-Verlag GmbH Germany, part of Springer Nature in 2020. The translation was done with the help of artificial intelligence (machine translation by the service DeepL.com) and in a subsequent editing, improved by the author. Springer Nature works continuously to further the development of tools for the production of books and on the related technologies to support the authors.

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