Introduction to Stochastic Analysis: Integrals and Differential Equations (Applied Stochastic Methods)

By Vigirdas Mackevicius

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This is an introduction to stochastic integration and stochastic differential equations written in an understandable way for a wide audience, from students of mathematics to practitioners in biology, chemistry, physics, and finances. The presentation is based on the naïve stochastic integration, rather than on abstract theories of measure and stochastic processes. The proofs are rather simple for practitioners and, at the same time, rather rigorous for mathematicians. Detailed application examples in natural sciences and finance are presented. Much attention is paid to simulation diffusion processes.

The topics covered include Brownian motion; motivation of stochastic models with Brownian motion; Itô and Stratonovich stochastic integrals, Itô's formula; stochastic differential equations (SDEs); solutions of SDEs as Markov processes; application examples in physical sciences and finance; simulation of solutions of SDEs (strong and weak approximations). Exercises with hints and/or solutions are also provided.

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Editorial Review

Review

"Thus, the book is a welcome addition in the effort to make stochastic integration and SDE as accessible as possible to the greater public interested in or in need of using them." (*Mathematical Reviews*, 1 February 2013)

"If I have a chance to teach (again) a course in stochastic financial modelling, I will definitely choose this to be among two or three sources to use. I have all the reasons to strongly recommend it to anybody in the area of modern stochastic modelling." (Zentralblatt MATH, 1 December 2012)

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