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Nota di contenuto	Intro -- Foreword -- Contents -- Part I Integration by Parts Formulas, Malliavin Calculus, and Regularity of Probability Laws -- Preface -- Problem 1 -- Problem 2 -- Problem 3 -- Problem 4 -- Conclusion -- Chapter 1 Integration by parts formulas and the Riesz transform -- 1.1 Sobolev spaces associated to probability measures -- 1.2 The Riesz transform -- 1.3 A first absolute continuity criterion: Malliavin-Thalmaier representation formula -- 1.4 Estimate of the Riesz transform -- 1.5 Regularity of the density -- 1.6 Estimate of the tails of the density -- 1.7 Local integration by parts formulas and local densities -- 1.8 Random variables -- Chapter 2 Construction of integration by parts formulas -- 2.1 Construction of integration by parts formulas -- 2.1.1 Derivative operators -- 2.1.2 Duality and integration by parts formulas -- 2.1.3 Estimation of the weights -- Iterated derivative operators, Sobolev norms -- Estimate of $ (F) $ -- Bounds for the weights $H_q(F,G)$ -- 2.1.4 Norms and weights -- 2.2 Short introduction to Malliavin calculus -- 2.2.1 Differential operators

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 Step 2: Finite-dimensional differential calculus in arbitrary dimension --
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Sommario/riassunto

This volume contains lecture notes from the courses given by Vlad Bally and Rama Cont at the Barcelona Summer School on Stochastic Analysis (July 2012). The notes of the course by Vlad Bally, co-authored with Lucia Caramellino, develop integration by parts formulas in an abstract setting, extending Malliavin's work on abstract Wiener spaces. The results are applied to prove absolute continuity and regularity results of the density for a broad class of random processes. Rama Cont's notes provide an introduction to the Functional Itô Calculus, a non-anticipative functional calculus that extends the classical Itô calculus to path-dependent functionals of stochastic processes. This calculus leads to a new class of path-dependent partial differential equations, termed Functional Kolmogorov Equations, which arise in the study of martingales and forward-backward stochastic differential equations.

This book will appeal to both young and senior researchers in probability and stochastic processes, as well as to practitioners in mathematical finance.
