Stochastic Differential Equations: A Dynamical Systems Approach

By Blane Hollingsworth

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The relatively new subject of stochastic differential equations has increasing importance in both theory and applications. The subject draws upon two main sources, probability/stochastic processes and differential equations/dynamical systems. There exists a significant ``culture gap'' between the corresponding research communities. The objective of the dissertation project is to present a concise yet mostly self-contained theory of stochastic differential equations from the differential equations/dynamical systems point of view, primarily incorporating semigroup theory and functional analysis techniques to study the solutions. Prerequisites from probability/stochastic processes are developed as needed. For continuous-time stochastic processes whose random variables are (Lebesgue) absolutely continuous, the Fokker-Planck equation is employed to study the evolution of the densities, with applications to predator-prey models with noisy coefficients.

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About the Author
Blane Hollingsworth received his Ph.D. from Auburn University in 2008.

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