



Diffusion Processes and Related Topics in Biology (Lecture Notes in Biomathematics)

By Luigi M. Ricciardi

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These notes are based on a one-quarter course given at the Department of Biophysics and Theoretical Biology of the University of Chicago in 1916. The course was directed to graduate students in the Division of Biological Sciences with interests in population biology and neurobiology. Only a slight acquaintance with probability and differential equations is required of the reader. Exercises are interwoven with the text to encourage the reader to play a more active role and thus facilitate his digestion of the material. One aim of these notes is to provide a heuristic approach, using as little mathematics as possible, to certain aspects of the theory of stochastic processes that are being increasingly employed in some of the population biology and neurobiology literature. While the subject may be classical, the novelty here lies in the approach and point of view, particularly in the applications such as the approach to the neuronal firing problem and its related diffusion approximations. It is a pleasure to thank Professors Richard C. Lewontin and Arnold J.F. Siegert for their interest and support, and Mrs. Angell Pasley for her excellent and careful typing. I . PRELIMINARIES 1. Terminology and Examples Consider an experiment specified by: a) the experiment's outcomes, ω , forming the space S ; b) certain subsets of S (called events) and by the probabilities of these events.

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