



Cellular Biophysics, Vol. 2: Electrical Properties

By Thomas Fischer Weiss

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Cellular Biophysics is a quantitatively oriented basic physiology text for senior undergraduate and graduate students in bioengineering, biophysics, physiology, and neuroscience programs. It will also serve as a major reference work for biophysicists. Developed from the author's notes for a course that he has taught at MIT for many years, these books provide a clear and logical explanation of the foundations of cell biophysics, teaching transport and the electrical properties of cells from a combined biological, physical, and engineering viewpoint. Each volume contains introductory chapters that motivate the material and present it in a broad historical context. Important experimental results and methods are described. Theories are derived almost always from first principles so that students develop an understanding of not only the predictions of the theory but also its limitations. Theoretical results are compared carefully with experimental findings and new results appear throughout. There are many time-tested exercises and problems as well as extensive lists of references. The volume on the electrical properties of cells covers both electrically inexcitable cells as well as electrically excitable cells such as neurons and muscle cells. Included are chapters on lumped-parameter and distributed-parameter models of cells, linear electric properties of cells, the Hodgkin-Huxley model of the giant axon of the squid, saltatory conduction in myelinated nerve fibers, and voltage-gated ion channels.

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Editorial Review

Review

"This beautiful treatment of cellular biophysics is a landmark. It is comprehensive, scholarly, interesting and clear as a bell. Everyone seriously interested in how cells do business with their surroundings will want to read it." --Charles F. Stevens, The Salk Institute "In this two volume series Weiss lays the foundations of cellular biophysics on physical principles in a framework that should be easily accessible to any student with a basic understanding of calculus and differential equations. The extensive set of thoughtful problems provided with each chapter will be invaluable in solidifying the student's understanding. I think it will be tremendous fun to teach from these texts." --Murray B. Sachs, Massey Professor and Director, Department of Biomedical Engineering, Johns Hopkins University

About the Author

Thomas F. Weiss is Thomas and Gerd Perkins Professor of Electrical and Bioelectrical Engineering, Department of Electrical Engineering and Computer Science, the Massachusetts Institute of Technology.

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