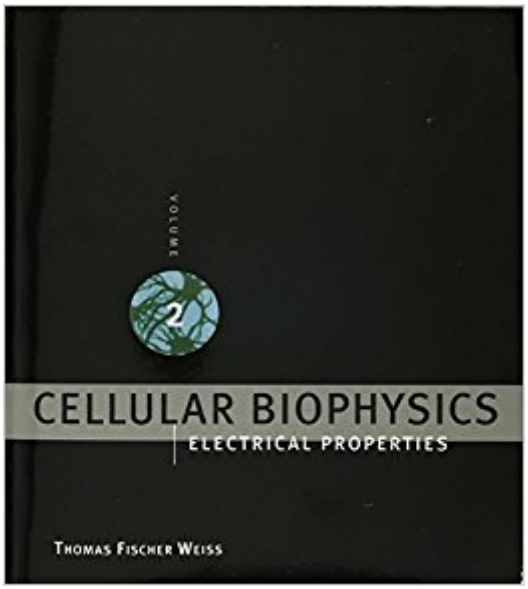
Cellular Biophysics: Electrical Properties (MIT Press) (Volume 2)



Synopsis

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.

Book Information

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Customer Reviews

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)Weiss's approach is to view the cell as a whole by relating each subsystem to the cell's overall function. Because he describes biophysical laws carefully and provides many examples, student and researcher alike can gain a deep appreciation and understanding of a cell's complexity. (Dr. Don H. Johnson, Professor of Electrical & Computer engineering and Statistics, Rice University)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)An easy to read and welcome undergraduate text on transport across cell membranes which provides both breadth and depth; in particular, an excellent introduction to electrophysiology. (Robert Plonsey, Pfizer Inc./ Edmund T. Pratt Jr., University Professor of Biomedical Engineering Duke University)

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. --This text refers to an out of print or unavailable edition of this title.

This book is in good condition. Thanks!!

Many books claim to be self-contained. A typical self-contained book usually has an appendix and breifly discusses some mathematical preliminaries, etc. that seldom helps a genuine beginner. A typical ``self-contained book'' is also somewhat thin to incorporate all the necessary background.This is a THICK volume.And, wow, this book shows you step-by-step how to get a solution of the cable equation. To be quite honest the approach was not entirely satisfactory nor is there any attempt to go beyond the passive membrane. However, I found many precious pieces that you cannot find in any other books. The only drawback is, I believe, this book is too thorough for a beginner. Nonetheless it makes a good reference book.

This is a mathematical cell neurophysiology tour de force which gives the most up to date

information on the cable equations. Anyone doing research on that small area will find an enormous wealth of information here. It is good as a reference text on cable equation derivations. The book is based on lectures given by Thomas Weiss at MIT in Biophysics. It was a tough course I am sure. This book is for serious mathematical neuroscientists.

For derivations of the cable equation and single-channel models, this book is unmatched. On the down-side, the coverage of related experimental neurobiology is quite dated.