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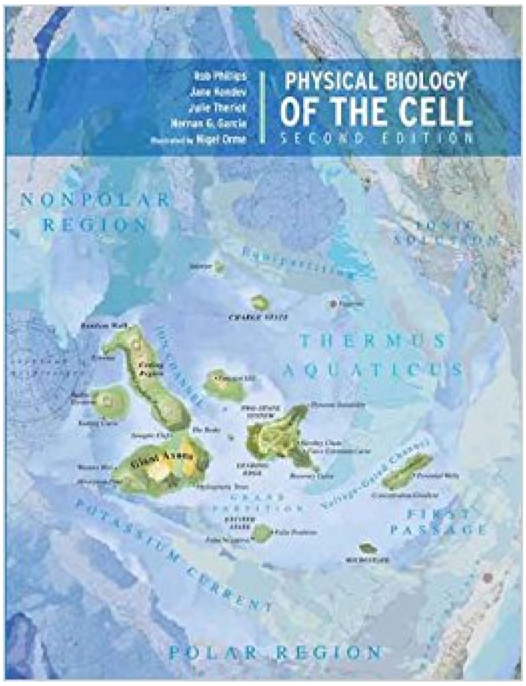

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Synopsis

Physical Biology of the Cell is a textbook for a first course in physical biology or biophysics for undergraduate or graduate students. It maps the huge and complex landscape of cell and molecular biology from the distinct perspective of physical biology. As a key organizing principle, the proximity of topics is based on the physical concepts that unite a given set of biological phenomena. Herein lies the central premise: that the appropriate application of a few fundamental physical models can serve as the foundation of whole bodies of quantitative biological intuition, useful across a wide range of biological problems. The Second Edition features full-color illustrations throughout, two new chapters, a significantly expanded set of end-of-chapter problems, and is available in a variety of e-book formats.

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Customer Reviews

Someone recommended this book to me and it’s definitely worthy. If you are looking for a book in biophysics or in a related area this is a good beginning.

The book arrived in practically new condition ahead of schedule. I am very pleased with my experience and the quality of the product! There were no scuff-marks, bent pages, or any other signs of wear. I can’t wait to read it!

a must read for anyone interested in biophysics

Good explanations. Some topics are discussed in so much detail that u may get lost, but its for good! I have had moments where I felt amazed by how human beings have broken down this nature to understand it better. Good book.

It is an exceptional addition to my library and i will use it in developing lectures in the Biochemistry course i lecture.

Received

This large, 800-page, 20 chapter, 9"x11" textbook is the size of a phonebook for a city of 200,000 people or so. Using many nicely-drawn figures and mathematical models, the authors work to unite the disciplines of biology, chemistry, and physics.Chapters 1 and 2 begin the book by first describing the molecular structure of the chemical compounds found in the cell, and then the geometry of the cell and its components. Chapter 3 addresses the time scale and time constraints for cellular processes. The hierarchy of biological time scales is summed up by Fig.3.2 on pp.78-79. There it is seen that protein synthesis requires tens of seconds, as does RNA transcription. Gating of ion channels requires only a single second, while enzyme catalysis requires only a microsecond. The authors provide a good example of complex molecular synthesis via an experiment showing the evolving molecular components of the bacterial flagellum--the assembly of which is seen to require about 3 hours (p.104). The authors mention that the E. coli bacteria are able to divide in as little as 1000s, although copying its genome alone (i.e DNA replication) would seem to require 3000s (p.92). It is found, however, that E. coli are able to get a jump on DNA replication by starting to replicate its daughter’s, granddaughter’s, and great-granddaughter’s chromosomes before it has even completed its own (p.113). It is also noted that the 3000s division time for E. coli division corresponds to the case where the environment supplies only glucose. For the case where the environment is rich in amino acids, the division time may be cut by a factor of two.Beginning with chapter 5 "Mechanical and Chemical Equilibrium in the Living Cell," this book draws heavily on an understanding of statistical mechanics and thermodynamics at the level of an advanced undergraduate or graduate course or textbook on that topic (e. g. Reif'sÃ Â Fundamentals of Statistical and Thermal Physics). Chapter 6, entitled "Entropy Rules," dedicates itself to the development of statistical mechanics, and chapter 7 applies these concepts to two-state systems. Chapter 8 applies statistical mechanics to the folding of polymer chains via a random walk analogy, especially with regard to DNA. Chapter 9, "Electrostatics for Salty Solutions," applies the techniques learned in a sophomore-level undergraduate course on electricity and magnetism to the electrical screening of macromolecules in a saline solution (e.g. Kip'sÃ Â Fundamentals of Electricity and Magnetism Second Edition).The bending and flexing of cell elements is discussed in chapters 10 and 11. Chapter 12 is dedicated to fluid flow, chapter 13 concerns diffusion, and chapter 14 deals with the influence of cell size on transport. Chapter 15 addresses cellular chemical reactions, including cytoskeletal polymerization and enzyme kinetics. Chapter 16 concerns molecular motors and chapter 17 is on membrane permeability. Chapter 18 is about evolutionary genetics and biological clocks. Chapter 19 discusses of the regulation of cell processes. Chapter 20 brings the book to a close by examining whether mathematical modes, such as those described in this volume, are able to accurately model the cell.

The second edition of Physical Biology of the Cell doesn't fall short to the expectations I had based on the master piece that I found in the first edition.This book guides you in an extremely friendly way through the fascinating interface between biology and the more quantitative science. The authors present in an exquisite way how tools borrow from physics and mathematics can be used to gain deeper insight into biological problems.With a brand new chapter and entertaining "Computational Exploration" sections, along with full colored images, the authors came again with a beautiful text book for any naive or field expert reader that decides to dive into the beauty of Physical Biology of the Cell

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