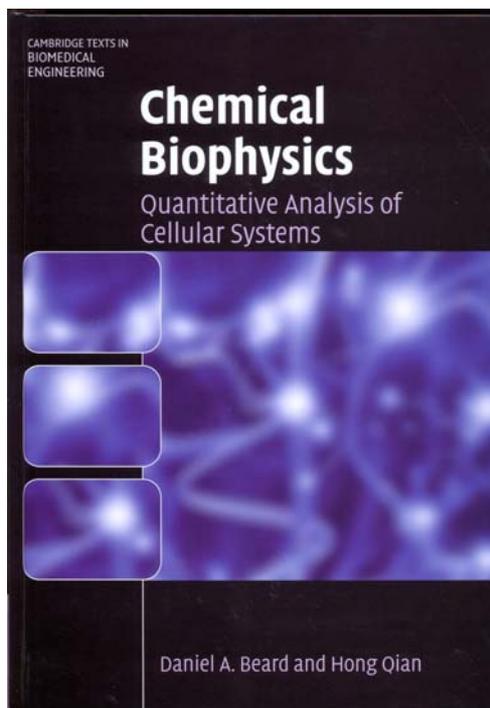


DANIEL A. BEARD, HONG QIAN
CHEMICAL BIOPHYSICS
QUANTITATIVE ANALYSIS OF CELLULAR SYSTEMS
SERIES: CAMBRIDGE TEXTS IN BIOMEDICAL
ENGINEERING



Chemical Biophysics provides an engineering-based approach to biochemical system analysis for graduate level courses on systems biology, computational bioengineering and molecular biophysics. It is the first textbook to apply rigorous physical chemistry principles to mathematical and computational modeling of biochemical systems for an interdisciplinary audience. The book is structured to show the student the basic biophysical concepts before applying this theory to computational modeling and analysis, building up to advanced topics and current research. End-of-chapter exercises range from confidence-building calculations to computational simulation projects.

The section *Background Material* introduces kinetics and thermodynamics of biochemical networks, providing a strong foundation to understand biological systems and applications to well-conceived biochemical models.

Topics covered in section *Analysis and Modeling of Biochemical Systems* include enzyme-mediated reactions, metabolic networks, signaling systems, biological transport processes, and electrophysiological systems.

The section *Special Topics* explores spatially distributed systems, constraint-based analysis for large-scale networks, protein-protein interaction, and stochastic phenomena in biochemical networks.

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It presents a systematic approach to analyzing biochemical systems. The complex subjects are described in a clear style, with carefully crafted definitions and derivations. This new book on the Chemical Biophysics of Cellular Processes by Dan Beard and Hong Qian does a wonderful job of formulating models for metabolic pathways, gene regulatory networks and protein interaction networks on the well-established principles of physical chemistry. Topics include enzyme catalyzed reactions, reaction-diffusion modeling, membrane transport, the chemical master equation and much more. Analyses at this level of detail are necessary before more complex concepts of molecular crowding and intracellular compartmentalization can be considered. Request PDF | On Jan 1, 2008, Daniel A. Beard and others published Chemical biophysics : quantitative analysis of cellular systems | Find, read and cite all the research you need on ResearchGate. Systems biology and whole-cell modelling are demanding increasingly comprehensive mathematical models of cellular biochemistry. These models require the development of simplified models of specific processes which capture essential biophysical features but without unnecessarily complexity. Recently there has been renewed interest in thermodynamically-based modelling of cellular processes. Quantitative Analysis of Cellular Systems. Daniel A. Beard, Hong Qian. Chemical Biophysics provides an engineering-based approach to biochemical system analysis for graduate-level courses on systems biology, computational bioengineering and molecular biophysics. It is the first textbook to apply rigorous physical chemistry principles to mathematical and computational modeling of biochemical systems for an interdisciplinary audience. The book is structured to show the student the basic biophysical concepts before applying this theory to computational modeling and analysis, building up to advanced topics and current research.