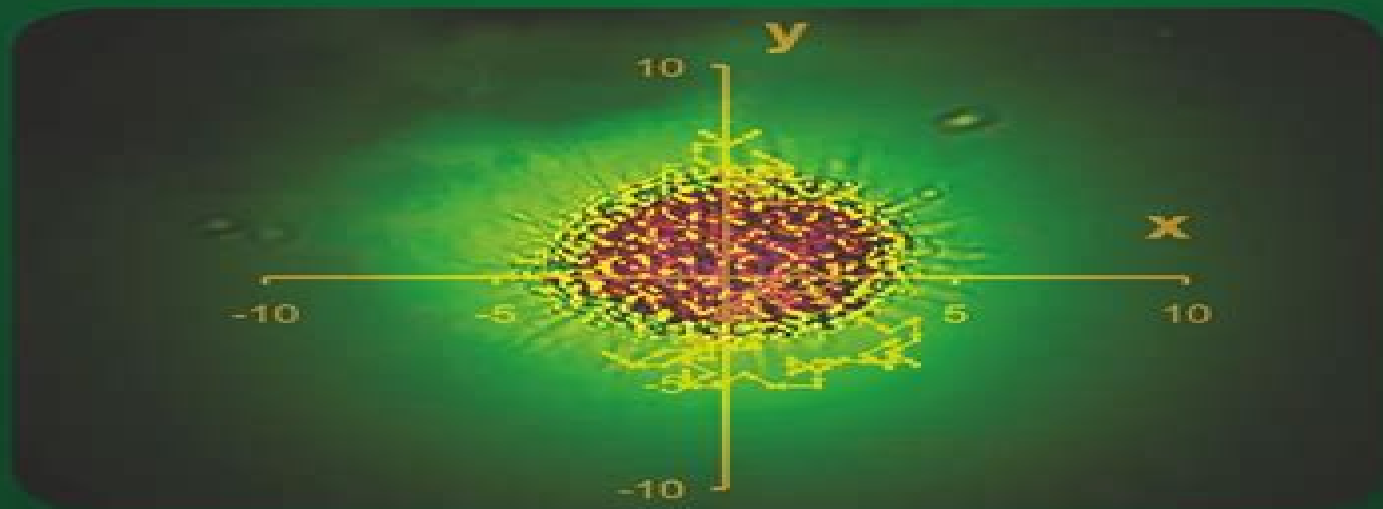


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SECOND EDITION

QUANTITATIVE UNDERSTANDING OF BIOSYSTEMS

An Introduction to Biophysics



THOMAS M. NORDLUND
PETER M. HOFFMANN



CRC Press
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Brian Fertig



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physiological organization present in the human body This book describes the building blocks of understanding from a reasonable but not high level technical language viewpoint employing the perspective of a clinical physician It brings together concepts from five specific branches of physics relevant to biology and medicine namely biophysics classical electromagnetism thermodynamics systems biology and quantum mechanics Key Features Broad and up to date overview of the field of metabolism especially connecting the spectrum of topics that range from modern physical underpinnings with cell biology to clinical practice Provides a deeper basic science and interdisciplinary understanding of biological systems that broaden the perspectives and therapeutic problem solving Introduces the concept of the Physiological Fitness Landscape which is inspired by the physics of phase transitions This first volume in a two volume set primarily targets an audience of clinical and science students biomedical researchers and physicians who would benefit from understanding each other s language

An Introduction to Single Molecule Biophysics Yuri L. Lyubchenko, 2017-11-22 This book gives an accessible detailed overview on techniques of single molecule biophysics SMB showing how they are applied to numerous biological problems associated with understanding the molecular mechanisms of DNA replication transcription and translation as well as functioning of molecular machines It covers major single molecule imaging and probing techniques highlighting key strengths and limitations of each method using recent examples The chapters begin with a discussion of single molecule fluorescence techniques followed by an overview of the atomic force microscope and its use for direct time lapse visualization of dynamics of molecular complexes at the nanoscale as well as applications in measurements of interactions between molecules and mechanical properties of isolated molecules and their complexes The next chapters address magnetic tweezers and optical tweezers including instrumentation fundamentals of operation and applications A final chapter turns to nanopore transport and nanopore based DNA sequencing technology that will play a major role in next generation genomics and healthcare applications

Introduction to Experimental Biophysics Jay L. Nadeau, 2017-10-10 Praise for the First Edition essential reading for any physical scientist who is interested in performing biological research Contemporary Physics an ambitious text Each chapter contains protocols and the conceptual reasoning behind them which is often useful to physicists performing biological experiments for the first time Physics Today This fully updated and expanded text is the best starting point for any student or researcher in the physical sciences to gain firm grounding in the techniques employed in molecular biophysics and quantitative biology It includes brand new chapters on gene expression techniques advanced techniques in biological light microscopy super resolution two photon and fluorescence lifetime imaging holography and gold nanoparticles used in medicine The author shares invaluable practical tips and insider s knowledge to simplify potentially confusing techniques The reader is guided through easy to follow examples carried out from start to finish with practical tips and insider s knowledge The emphasis is on building comfort with getting hands wet with basic methods and finally understanding when and how to apply or adapt them to address different questions Jay L Nadeau is a scientific researcher

and head of the Biomedical Engineering in Advanced Applications of Quantum Oscillatory and Nanotechnological Systems BEAAQONS lab at Caltech and was previously associate professor of biomedical engineering and physics at McGill University

Systems Immunology Jayajit Das, Ciriya Jayaprakash, 2018-09-03 Taken together the body of information contained in this book provides readers with a bird's eye view of different aspects of exciting work at the convergence of disciplines that will ultimately lead to a future where we understand how immunity is regulated and how we can harness this knowledge toward practical ends that reduce human suffering I commend the editors for putting this volume together Arup K Chakraborty Robert T Haslam Professor of Chemical Engineering and Professor of Physics Chemistry and Biological Engineering Massachusetts Institute of Technology Cambridge USA New experimental techniques in immunology have produced large and complex data sets that require quantitative modeling for analysis This book provides a complete overview of computational immunology from basic concepts to mathematical modeling at the single molecule cellular organism and population levels It showcases modern mechanistic models and their use in making predictions designing experiments and elucidating underlying biochemical processes It begins with an introduction to data analysis approximations and assumptions used in model building Core chapters address models and methods for studying immune responses with fundamental concepts clearly defined Readers from immunology quantitative biology and applied physics will benefit from the following Fundamental principles of computational immunology and modern quantitative methods for studying immune response at the single molecule cellular organism and population levels An overview of basic concepts in modeling and data analysis Coverage of topics where mechanistic modeling has contributed substantially to current understanding Discussion of genetic diversity of the immune system cell signaling in the immune system immune response at the cell population scale and ecology of host pathogen interactions

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