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Statistical Thermodynamics in Biology, Chemistry, Physics, and Nanoscience Elsevier
Introductory Statistical Thermodynamics is a text for an introductory one-semester course in statistical thermodynamics for upper-level undergraduate and graduate students in physics and engineering. The book offers a high level of detail in derivations of all equations and results. This information is necessary for students to grasp difficult concepts in physics that are needed to move on to higher level courses. The text is elementary, self contained, and mathematically well-founded, containing a number of problems with detailed solutions to help students to grasp the more difficult theoretical concepts. Beginning chapters place an emphasis on quantum mechanics Includes problems with detailed solutions and a number of detailed theoretical derivations at the end of each chapter Provides a high level of detail in derivations of all equations and results

Soft Matter Physics Springer Science & Business Media
Protein NMR Spectroscopy, Second Edition combines a comprehensive theoretical treatment of NMR spectroscopy with an extensive exposition of the experimental techniques applicable to proteins and other biological macromolecules in solution. Beginning with simple theoretical models and experimental techniques, the book develops the complete repertoire of theoretical principles and experimental techniques necessary for understanding and implementing the most sophisticated NMR experiments. Important new techniques and applications of NMR spectroscopy have emerged since the first edition of this extremely successful book was published in 1996. This updated version includes new sections describing measurement and use of residual dipolar coupling constants for structure determination, TROSY and deuterium labeling for application to large macromolecules, and experimental techniques for characterizing conformational dynamics. In addition, the treatments of instrumentation and signal acquisition, field gradients, multidimensional spectroscopy, and structure calculation are updated and enhanced. The book is written as a graduate-level textbook and will be of interest to

biochemists, chemists, biophysicists, and structural biologists who utilize NMR spectroscopy or wish to understand the latest developments in this field. Provides an understanding of the theoretical principles important for biological NMR spectroscopy Demonstrates how to implement, optimize and troubleshoot modern multi-dimensional NMR experiments Allows for the capability of designing effective experimental protocols for investigations of protein structures and dynamics Includes a comprehensive set of example NMR spectra of ubiquitin provides a reference for validation of experimental methods

Biological Membrane Ion Channels World Scientific Publishing Company

A Top 25 CHOICE 2016 Title, and recipient of the CHOICE Outstanding Academic Title (OAT) Award. How much energy is released in ATP hydrolysis? How many mRNAs are in a cell? How genetically similar are two random people? What is faster, transcription or translation? Cell Biology by the Numbers explores these questions and dozens of others provid

Physical Biology of the Cell Univ Science Books

This book addresses the recent developments in the investigation and manipulation of liquids at the nanoscale. This new field has shown important breakthroughs on the basic understanding of physical mechanisms involving liquid interfaces, which led to applications in nanopatterning. It has also consequences in force microscopy imaging in liquid environment. The book proposes is a timely review of these various aspects. It is co-authored by 25 among the most prominent scientists in the field.

Molecular Theory of Water and Aqueous Solutions: The role of water in protein folding, self-assembly and molecular recognition Garland Science

"The aim of this book is to explain the unusual properties of both pure liquid water and simple aqueous solutions, in terms of the properties of single molecules and interactions among small numbers of water molecules. It is mostly the result of the author's own research spanning over 40 years in the field of aqueous solutions."--Jacket.

Chemical Kinetics and Reaction Dynamics CRC Press

Physical Chemistry for the Biosciences has been optimized for a one-semester introductory course in physical chemistry for students of biosciences.

Water in Biological and Chemical Processes John Wiley & Sons

New textbooks at all levels of chemistry appear with great regularity. Some fields like basic biochemistry, organic reaction mechanisms, and chemical thermodynamics are well represented by many excellent texts, and new or revised editions are published sufficiently often to keep up with progress in research. However, some areas of chemistry, especially many of those taught at the graduate level, suffer from a reallack of up-to-date textbooks. The most serious needs occur in fields that are rapidly changing. Textbooks in these subjects usually have to be written by scientists actually involved in the research which is advancing the field. It is not often easy to persuade such individuals to set aside to help spread the knowledge they have accumulated. Our goal, in this series, is to pinpoint areas of chemistry where recent progress has outpaced what is covered in any available textbooks, and then seek out and persuade experts in these fields to produce relatively concise but instructive introductions

to their fields. These should serve the needs of one semester or one quarter graduate courses in chemistry and biochemistry. In some cases the availability of texts in active research areas should help stimulate the creation of new courses. New York CHARLES R. CANTOR Preface to the Second Edition The original plan for the first edition of this book was to title it Enzyme Purification: Principles and Practice.

Cell Biology by the Numbers World Scientific Publishing Company Incorporated

Div This text teaches the principles underlying modern chemical kinetics in a clear, direct fashion, using several examples to enhance basic understanding. Solutions to selected problems. 2001 edition. /div

Molecular Engineering Thermodynamics CRC Press

Building up gradually from first principles, this unique introduction to modern thermodynamics integrates classical, statistical and molecular approaches and is especially designed to support students studying chemical and biochemical engineering. In addition to covering traditional problems in engineering thermodynamics in the context of biology and materials chemistry, students are also introduced to the thermodynamics of DNA, proteins, polymers and surfaces. It includes over 80 detailed worked examples, covering a broad range of scenarios such as fuel cell efficiency, DNA/protein binding, semiconductor manufacturing and polymer foaming, emphasizing the practical real-world applications of thermodynamic principles; more than 300 carefully tailored homework problems, designed to stretch and extend students' understanding of key topics, accompanied by an online solution manual for instructors; and all the necessary mathematical background, plus resources summarizing commonly used symbols, useful equations of state, microscopic balances for open systems, and links to useful online tools and datasets.

Basic Chemical Thermodynamics Garland Science

Instrumental techniques for analyzing intrinsically disordered proteins The recently recognized phenomenon of protein intrinsic disorder is gaining significant interest among researchers, especially as the number of proteins and protein domains that have been shown to be intrinsically disordered rapidly grows. The first reference to tackle this little-documented area, Instrumental Analysis of Intrinsically Disordered Proteins: Assessing Structure and Conformation provides researchers with a much-needed, comprehensive summary of recent achievements in the methods for structural characterization of intrinsically disordered proteins (IDPs). Chapters discuss: Assessment of IDPs in the living cell Spectroscopic techniques for the analysis of IDPs, including NMR and EPR spectroscopies, FTIR, circular dichroism, fluorescence spectroscopy, vibrational methods, and single-molecule analysis Single-molecule techniques applied to the study of IDPs Assessment of IDP size and shape Tools for the analysis of IDP conformational stability Mass spectrometry Approaches for expression and purification of IDPs With contributions from an international selection of leading researchers, Instrumental Analysis of Intrinsically Disordered Proteins: Assessing Structure and Conformation fills an important need in a rapidly growing field. It is required reading for biochemists, biophysicists, molecular biologists, geneticists, cell biologists, physiologists, and specialists in drug design and development, proteomics, and molecular medicine with an interest in proteins and peptides.

Liquids, Solutions and Vapours OUP Oxford

Learn classical thermodynamics alongside statistical mechanics and how macroscopic and microscopic ideas interweave with this fresh approach to the subjects.

Properties of Materials Royal Society of Chemistry

Molecular Driving Forces, Second Edition E-book is an introductory statistical thermodynamics text that describes the principles and forces that drive chemical and biological processes. It demonstrates how the complex behaviors of molecules can result from a few simple physical processes, and how simple models provide surprisingly accurate insights into the workings of the molecular world. Widely adopted in its First Edition, Molecular Driving Forces is regarded by teachers and students as an accessible textbook that illuminates underlying principles and concepts. The Second Edition includes two brand new chapters: (1) "Microscopic Dynamics" introduces single molecule experiments; and (2) "Molecular Machines" considers how nanoscale machines and engines work. "The Logic of Thermodynamics" has been expanded to its own chapter and now covers heat, work, processes, pathways, and cycles. New practical applications,

examples, and end-of-chapter questions are integrated throughout the revised and updated text, exploring topics in biology, environmental and energy science, and nanotechnology. Written in a clear and reader-friendly style, the book provides an excellent introduction to the subject for novices while remaining a valuable resource for experts.

Applied Mathematics And Modeling For Chemical Engineers Courier Corporation

Biophysical techniques are used in many key stages of the drug discovery process including in screening for new receptor ligands, in characterising drug mechanisms, and in validating data from biochemical and cellular assays. This book provides an overview of the biophysical methods applied in drug discovery today, including traditional techniques and newer developments. Perspectives from academia and industry across a spectrum of techniques are brought together in a single volume. Small and biotherapeutic approaches are covered and strengths and limitations of each technique are presented. Case studies illustrate the application of each technique in real applied examples. Finally, the book covers recent developments in areas such as electron microscopy with discussions of their possible impact on future drug discovery. This is a go-to volume for biophysicists, analytical chemists and medicinal chemists providing a broad overview of techniques of contemporary interest in drug discovery.

Protein Purification World Scientific

From the hydrophobic effect to protein-ligand binding, statistical physics is relevant in almost all areas of molecular biophysics and biochemistry, making it essential for modern students of molecular behavior. But traditional presentations of this material are often difficult to penetrate.

Statistical Physics of Biomolecules: An Introduction brin

Thermodynamics and Statistical Mechanics Cambridge University Press

A comprehensive presentation of essential topics for biological engineers, focusing on the development and application of dynamic models of biomolecular and cellular phenomena. This book describes the fundamental molecular and cellular events responsible for biological function, develops models to study biomolecular and cellular phenomena, and shows, with examples, how models are applied in the design and interpretation of experiments on biological systems. Integrating molecular cell biology with quantitative engineering analysis and design, it is the first textbook to offer a comprehensive presentation of these essential topics for chemical and biological engineering. The book systematically develops the concepts necessary to understand and study complex biological phenomena, moving from the simplest elements at the smallest scale and progressively adding complexity at the cellular organizational level, focusing on experimental testing of mechanistic hypotheses. After introducing the motivations for formulation of mathematical rate process models in biology, the text goes on to cover such topics as noncovalent binding interactions; quantitative descriptions of the transient, steady state, and equilibrium interactions of proteins and their ligands; enzyme kinetics; gene expression and protein trafficking; network dynamics; quantitative descriptions of growth dynamics; coupled transport and reaction; and discrete stochastic processes. The textbook is intended for advanced undergraduate and graduate courses in chemical engineering and bioengineering, and has been developed by the authors for classes they teach at MIT and the University of Minnesota.

Nanoscale Liquid Interfaces John Wiley & Sons

This widely acclaimed text, now in its sixth edition and translated into many languages, continues to present a clear, simple and concise introduction to chemical thermodynamics. An examination of equilibrium in the everyday world of mechanical objects provides a starting point for an accessible account of the factors that determine equilibrium in chemical systems. This straightforward approach leads students to a thorough understanding of the basic principles of thermodynamics, which are then applied to a wide range of physical chemical systems. The book also discusses the problems of non-ideal solutions and the concept of activity, and provides an introduction to the

molecular basis of thermodynamics. Over six editions, the views of teachers of the subject and their students have been incorporated. Reference to the phase rule has been included in this edition and the notation has been revised to conform to current IUPAC recommendations. Students taking courses in thermodynamics will continue to find this popular book an excellent introductory text.

Assessing Structure and Conformation Royal Society of Chemistry

Starting with just a few basic principles of probability and the distribution of energy, *Introduction to Molecular Thermodynamics* takes students on an adventure into the inner workings of the molecular world like no other, from probability to Gibbs energy and beyond, following a logical step-by-step progression of ideas.

Molecular Driving Forces Garland Science

Protein Actions: Principles and Modeling is aimed at graduates, advanced undergraduates, and any professional who seeks an introduction to the biological, chemical, and physical properties of proteins. Broadly accessible to biophysicists and biochemists, it will be particularly useful to student and professional structural biologists and molecular biophysicists, bioinformaticians and computational biologists, biological chemists (particularly drug designers) and molecular bioengineers. The book begins by introducing the basic principles of protein structure and function. Some readers will be familiar with aspects of this, but the authors build up a more quantitative approach than their competitors.

Emphasizing concepts and theory rather than experimental techniques, the book shows how proteins can be analyzed using the disciplines of elementary statistical mechanics, energetics, and kinetics. These chapters illuminate how proteins attain biologically active states and the properties of those states. The book ends with a synopsis the roles of computational biology and bioinformatics in protein science.

Oxford University Press on Demand

Freeze-drying, or lyophilization, is a well established technology used in the preservation of numerous pharmaceutical and biological products. This highly effective dehydration method involves the removal of water from frozen materials via the direct sublimation of ice. In recent years, this process has met with many changes, as have the regulatio

Protein NMR Spectroscopy Cambridge University Press

In *Thermal Physics: Thermodynamics and Statistical Mechanics for Scientists and Engineers*, the fundamental laws of thermodynamics are stated precisely as postulates and subsequently connected to historical context and developed mathematically. These laws are applied systematically to topics such as phase equilibria, chemical reactions, external forces, fluid-fluid surfaces and interfaces, and anisotropic crystal-fluid interfaces. Statistical mechanics is presented in the context of information theory to quantify entropy, followed by development of the most important ensembles: microcanonical, canonical, and grand canonical. A unified treatment of ideal classical, Fermi, and Bose gases is presented, including Bose condensation, degenerate Fermi gases, and classical gases with internal structure. Additional topics include paramagnetism, adsorption on dilute sites, point defects in crystals, thermal aspects of intrinsic and extrinsic semiconductors, density matrix formalism, the Ising model, and an introduction to Monte Carlo simulation. Throughout the book, problems are posed and solved to illustrate specific results and problem-solving techniques. Includes applications of interest to physicists, physical chemists, and materials scientists, as well as materials, chemical, and mechanical engineers Suitable as a textbook for advanced undergraduates, graduate students, and practicing researchers Develops content systematically with increasing order of complexity Self-contained, including nine appendices to handle necessary background and technical details