Statistical Physics of Biomolecules: An Introduction

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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** brings "down to earth" some of the most intimidating but important theories of molecular biophysics.

With an accessible writing style, the book unifies statistical, dynamic, and thermodynamic descriptions of molecular behavior using probability ideas as a common basis. Numerous examples illustrate how the twin perspectives of dynamics and equilibrium deepen our understanding of essential ideas such as entropy, free energy, and the meaning of rate constants. The author builds on the general principles with specific discussions of water, binding phenomena, and protein conformational changes/folding. The same probabilistic framework used in the introductory chapters is also applied to non-equilibrium phenomena and to computations in later chapters. The book emphasizes basic concepts rather than cataloguing a broad range of phenomena.

Focuses on what students need to know now

Students build a foundational understanding by initially focusing on probability theory, low-dimensional models, and the simplest molecular systems. The basics are then directly developed for biophysical phenomena, such as water behavior, protein binding, and conformational changes. The book’s accessible development of equilibrium and dynamical statistical physics makes this a valuable text for students with limited physics and chemistry backgrounds.

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