Biophysics: Tools and Techniques for the Physics of Life covers the experimental, theoretical, and computational tools and techniques of biophysics. It addresses the purpose, science, and application of all physical science instrumentation, theoretical analysis, and biophysical computational methods used in current research labs.

The book first presents the historical background, concepts, and motivation for using a physical science toolbox to understand biology. It then familiarizes undergraduate students from the physical sciences with essential biological knowledge.

The text subsequently focuses on experimental biophysical techniques that primarily detect biological components or measure/control biological forces. The author describes the science and application of key tools used in imaging, detection, general quantitation, and biomolecular interaction studies, which span multiple length and time scales of biological processes both in the test tube and in the living organism.

Moving on to theoretical and computational biophysics tools, the book presents analytical mathematical methods and numerical simulation approaches for tackling challenging biological questions including exam-style questions at the end of each chapter as well as step-by-step solved exercises. It concludes with a discussion of the future of this exciting field.

Future innovators will need to be trained in multidisciplinary science to be successful in industry, academia, and government support agencies. Addressing this challenge, this textbook educates future leaders on the development and application of novel physical science approaches to solve complex problems linked to biological questions.

Features:

- Provides the full, modern physical science toolbox of experimental, theoretical, and computational techniques, such as bulk ensemble methods, single-molecule tools, live-cell and test tube methods, pencil-on-paper theory approaches, and simulations.
- Incorporates worked examples for the most popular physical science tools by providing full diagrams and a summary of the science involved in the application of the tool.
- Reinforces the understanding of key concepts and biological questions.

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A solutions manual is available upon qualifying course adoption.

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