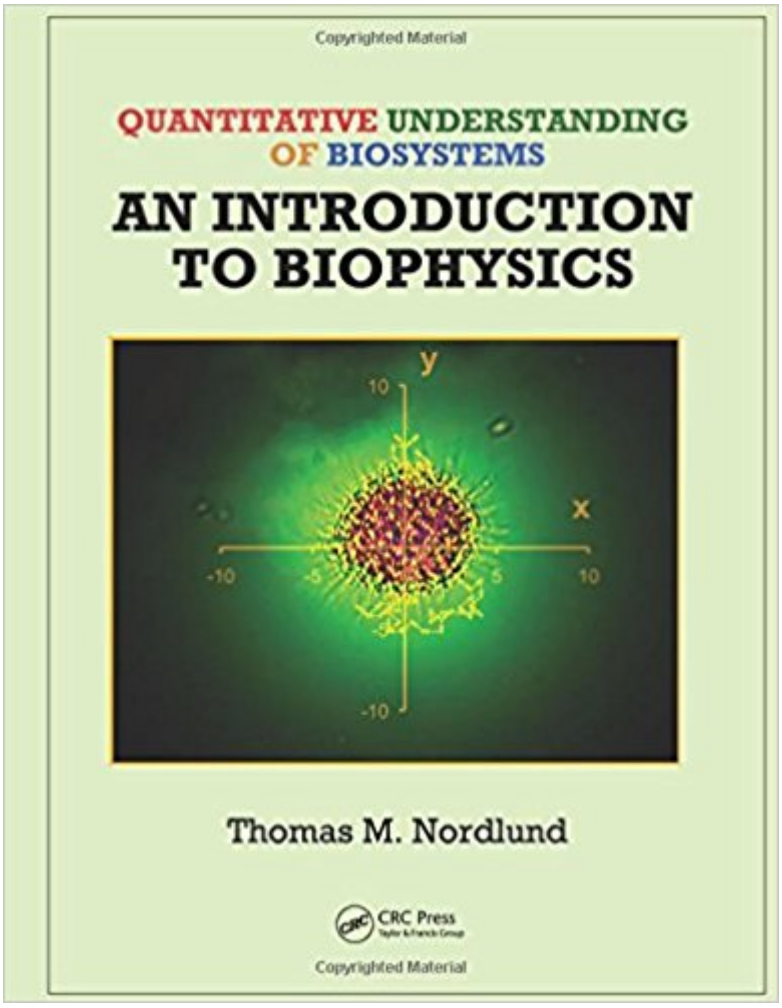
Quantitative Understanding Of Biosystems: An Introduction To Biophysics (Foundations Of Biochemistry And Biophysics)



Synopsis

Quantitative Understanding of Biosystems: An Introduction to Biophysics focuses on the behavior and properties of microscopic structures that underlie living systems. It clearly describes the biological physics of macromolecules, subcellular structures, and whole cells, including interactions with light. Providing broad coverage of physics, chemistry, biology, and mathematics, this color text features: Mathematical and computational toolsâ •graphing, calculus, simple differential equations, diagrammatic analysis, and visualization tools Randomness, variation, statistical mechanics, distributions, and spectra The biological micro- and nanoworldâ •structures, processes, and the physical laws Quantum effectsâ •photosynthesis, UV damage, electron and energy transfer, and spectroscopic characterization of biological structures Through its active learning approach, the text encourages practical comprehension of the behavior of biosystems, rather than knowledge of the latest research. The author includes graph- and diagram-centered physics and mathematics, simple software, frequent checks of understanding, and a repetition of important ideas at higher levels or from different points of view. After completing this book, students will gain significant computational and project experience and become competent at quantitatively characterizing biosystems. CD-ROM Resource The accompanying CD contains multimedia learning tools, such as video clips and animations, that illustrate intrinsically dynamic processes. For students inexperienced in the application of mathematics and physical principles to naturally occurring phenomena, this multimedia component emphasizes what is most obvious about biological systems: living things move. Students can also manipulate and re-program the included Excel graphs.

Book Information

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Customer Reviews

The author has done a magnificent job in writing an easy-to-follow, intriguing and well-written introductory section. â | the chapter referring to â ˆDirect ultraviolet effects on biological systemsâ ™ is probably my favourite. Exceptionally written, it contains informative material found only in specialised textbooks and is equally attractive for science and medical students. â | the text is stimulatingly and well written for the focused student. Apart from the scientific content, the artwork of the book is of high quality, aiding significantly the understanding of the concepts presented. â | this book is highly recommended for introducing biophysics to the motivated and curious undergraduate students.â •Nikolaos Kourkoumelis, Contemporary Physics, June 2012 This terrific text offers a broad range of learning opportunities for many undergraduate majors. It is filled with a wide range of analogies that facilitate understanding of fundamental biophysics, thus making abstract concepts easier to comprehend. It uses a friendly language that avoids unnecessary technicalities and terminologies. â | Almost all sections of the book illustrate conceptual examples supplemented by estimates and calculations of biophysical parameters, describing biological problems in depth. This characteristic marks the fundamental distinction between this biophysics book and others. It will enable students to understand the significance of biological parameters through quantitative examplesâ •a modern way of learning biophysics.â •American Journal of Physics, February 2012 The book contains a beautiful review of essential physics for understanding biological systems, particularly at the molecular scale, emphasizing that which is rarely taught in standard physics classes: how to think like a physicist. The chapters on quantum mechanics and the interaction of photons with biological systems are particularly welcome, and set this book apart. I believe that the progression through to the effects of UV radiation and sunscreens will be popular with students.â •Ernest Barreto, George Mason University This book is so far the best on the market in terms of an undergraduate biophysics textbook. It is very likely that I will adopt this textbook for my next year! The book is quite an equilibrated comprehensive description of the basic mechanisms that govern biological systems. This textbook is indeed a great example of a quantitative approach for teaching undergraduate students from physics and biological sciences. The material offers conceptual examples and broad lists of key references. The textbook will have great success not only for the clarity of presentation, but also for its structure and numerous examples â | .â •Liviu

Movileanu, Department of Physics and Syracuse Biomaterials Institute, Syracuse University This is an excellent book for the physics or bioengineering undergraduate student. It is approachable at the junior level and it is written in a very clear style with plenty of useful and colorful figures. Particularly, it is nice how the book builds up toward the main equations to make them intuitive from basic principlesâ | . The accompanying CD is very useful as well. The glossary section is an excellent tool for the student not familiar with biology.â •Diego Krapf, School of Biomedical Engineering, Colorado State University Biology is complex, but teaching it may be even more complicated. Modern biology integrates a traditional biology perspective with a deeper look into mechanisms that require perspectives from physics and chemistry. However, many instructors who want to teach courses that bridge these fields often are confronted with the problem that no good text exists. We therefore need textbooks that can function as the basis for courses that will train students to integrate these diverse disciplines. Quantitative Understanding of Biosystems is a text geared toward starting a student along this path. The book provides a good introduction into a broad range of biology and physics topics and shows how physics can explain aspects of biological mechanisms at many different length scales. The text also provides a nice exposition on the differences between how a biologist approaches a problem and how a physicist does. This discussion is important for helping to bring these two communities together, and will aid in making a course developed using this text applicable to students from biology as well as from physics, chemistry, math, or engineering.â •Charles Wolgemuth, University of Connecticut Health Center A superb pedagogical textbook about the behavior and properties of the microscopic structures that form the essential building blocks of living systems. â | Full-color illustrations aid students in their understanding of how to use mathematical tools (graphing, calculus, simple differential equations, diagrammatic analysis, and more) to better grasp, analyze, and project solutions to problems involving the quantitative characterization of biosystems. An accompanying CD-ROM offers â ˆactiveâ ™ versions of Excel graphs and diagrams listed in the text, and links to mathematical, biological, and biochemical source data. â | an excellent college text or self-instruction manual for advanced biophysics science students.â •Midwest Book Review, May 2011 Combines a nice balance of topics with important basic material â | . The emphasis on problems, projects, and tools is very helpful.â •Stephen J. Hagen, University of Florida A versatile textbook that also serves as a good introduction to quantitative biology â | strikes a balance between â ˆnot too difficultâ ™ for life science students and â ˆconceptually rich and challengingâ ™ for physics and math students.â •Yuri Gartstein and Stephen Levene, The University of Texas at Dallas

Thomas M. Nordlund is an associate professor in the Department of Physics at the University of Alabama at Birmingham. A Fellow of the American Physical Society, Dr. Nordlund has performed research in biomolecular dynamics for 30 years. He earned his Ph.D. in physics from the University of Illinois at Urbana-Champaign, under the supervision of Hans Frauenfelder.

I am a graduate student pursuing new research interests in biophysics. At my university, the first class in the biophysics track chose this text and delivered its content as a merged undergrad/grad class. Generally, I found the book very helpful as an introduction to biophysics but the text lacks flow from topic to topic and the questions found at the end of each section are very open-ended which can sometimes be a good and bad thing. Overall, this first attempt by the author is a comprehensive start-up guide for those interested in biophysics. The most valuable feature of the text is the merging of biology and physics in near-perfect proportion which spurs many intriguing conversations between students. In order to capitalize on this, as the author mentions within the text, one must pair physicists with biologists; and with that, the book helped create a valuable experience for my first interaction with biophysics.

The website describes this book as being "in color". However the copy I received is entirely in black and white which makes it difficult to follow examples with multiple colors when the textbook says "so and so is in red, this is in blue" and all I am looking at is a black and white image.The textbook itself is quite good, I just wish the copy I received followed the description given by

"Biology is complex, but teaching it may be even more complicated. Modern biology integrates a traditional biology perspective with a deeper look into mechanism that requires perspectives from physics and chemistry. However, many instructors who want to teach courses that bridge these fields often are confronted with the problem that no good text exists. We therefore need text books that can function as the basis for courses that will train students to integrate these diverse disciplines. Quantitative Understanding of Biosystems: An Introduction to Biophysics by Thomas M. Nordlund is a text geared toward starting a student along this path. The book provides a good introduction into a broad range of biology and physics topics and shows how physics can explain aspects of biological mechanisms at many different length scales. The text also provides a nice exposition on the differences between how a biologist approaches a problem and how a physicist does. This discussion is important for helping to bring these two communities together, and will aid in making a course developed using this text applicable to students from biology as well as from

physics, chemistry, math, or engineering." -Professor Charles Wolgemuth, University of Connecticut Health Center

"This is an excellent book for the Physics or Bioengineering undergraduate student. It is approachable at the junior level and it is written in a very clear style with plenty of useful and colorful figures. Particularly, it is nice how the book builds up towards the main equations to make them intuitive from basic principles. It spends a lot of time describing the basic physics that are needed.... It has a strong emphasis on the methods that...is attractive for the engineering curriculum. The book can be divided in three parts: Chapters 1-7, Background; Chapters 8-11, Light Processes; and Chapters 9-17, Motion and Reactions in Biological Systems. In my opinion the first two parts...may be useful for the junior student with an interest in the applied physics/engineering aspects of biophysics. The accompanying CD is very useful as well. The glossary section is an excellent tool for the student not familiar with the biology." -Professor Diego Krapf, School of Biomedical Engineering, Colorado State University"Combines a nice balance of topics with important basic material ... . The emphasis on problems, projects, and tools is very helpful." -Professor Stephen J. Hagen, University of Florida, Gainesville, USA"A versatile textbook that also serves as a good introduction to quantitative biology ... strikes a balance between `not too difficult' for life science students and `conceptually rich and challenging' for physics and math students." -Professors Yuri Gartstein and Stephen Levene, The University of Texas at Dallas, USA

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