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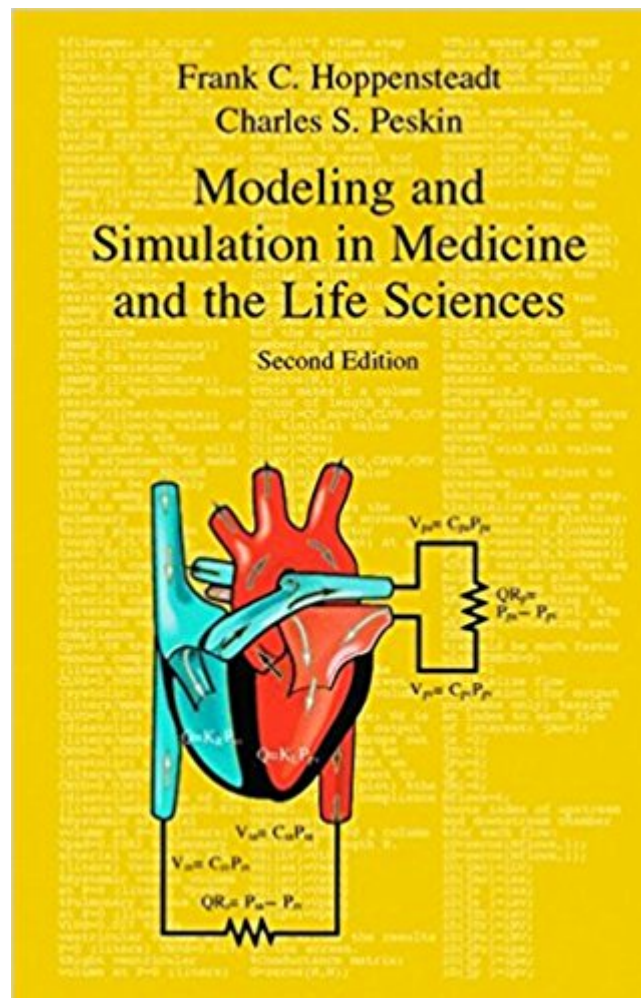
Modeling And Simulation In Medicine And The Life Sciences (Texts In Applied Mathematics)

Synopsis

The result of lectures given by the authors at New York University, the University of Utah, and Michigan State University, the material is written for students who have had only one term of calculus, but it contains material that can be used in modeling courses in applied mathematics at all levels through early graduate courses. Numerous exercises are given as well as solutions to selected exercises, so as to lead readers to discover interesting extensions of that material. Throughout, illustrations depict physiological processes, population biology phenomena, corresponding models, and the results of computer simulations. Topics covered range from population phenomena to demographics, genetics, epidemics and dispersal; in physiological processes, including the circulation, gas exchange in the lungs, control of cell volume, the renal counter-current multiplier mechanism, and muscle mechanics; to mechanisms of neural control. Each chapter is graded in difficulty, so a reading of the first parts of each provides an elementary introduction to the processes and their models.

Book Information

Series: Texts in Applied Mathematics (Book 10)

Hardcover: 355 pages

Publisher: Springer; 2nd edition (January 16, 2004)

Language: English

ISBN-10: 0387950729

ISBN-13: 978-0387950723

Product Dimensions: 6.1 x 0.9 x 9.2 inches

Shipping Weight: 1.4 pounds (View shipping rates and policies)

Average Customer Review: 3.7 out of 5 stars   7 customer reviews

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Customer Reviews

"This is an introductory book on mathematical modeling in the bio-sciences. It is written for mathematicians as well as for life scientists. Simple models are presented, and previous knowledge of biology is not required for understanding the book. All the essential biological background is given in the text, while basic mathematical knowledge is sufficient for reading a large part of the book. In

each chapter, the material is organized in increasing order of complexity followed by exercises. Some of the exercises deal with the material of that chapter, while others are projects that extend the preceding material. Many chapters contain sections with suggestions for computing projects. Simulations are done in Matlab and computer code is included in the text...."Ã Â (Miljenko Marusic, Mathematical Reviews)

Love the way this book is written. Easy to follow and understand. Nice explanations. Not exactly the kind of book I would see myself leisurely read, yet that's exactly what I was doing!

The samples use in the book to cover different topics like the cardiac system or the cell membrane potential in MATLAB are useful and well written. The book could be simplified in the way it is written to make it more accessible to students and non mathematicians. I liked the book in general since the samples were so complete.

Excellent text on modeling physiological systems. It wastes few words. A knowledge of algebra and elementary calculus is necessary but not more. A working knowledge of physiology is helpful but also not necessary. I would highly recommend this book to anyone studying medical engineering.

This version of the book is good enough.Some of the words and letters are really hard to understand, especially the sub-print, so it can get frustrating when you need to study or do homework.Only buy if you need the book immediately.

Complicated descriptions of physiological and biological mathematical models. Too bland and no love put into the book, I wish they would give it a make over.

This book is not very interesting unless you are a freshman math major who has a subtle interest in physiology. The book more or less is a set of derivations and cute math tricks despite the fact it was designed to teach concepts of physiological modeling. I had this book as the focus of a biomedical engineering graduate class, and it's not very useful for that. Probably 3/4 of the questions in the back of each chapter could be summarized as "plug (some value) into (some equation). What is the answer?" They do the thinking for you and then ask you to regurgitate a formula or plug and chug. It doesn't demand any understanding of the material to answer most of the questions. There is almost no design or medical treatment choices involved--you are just studying something for the sake of

studying it. The math tricks and derivations are really the focus of the book, rather than the actual conservation principles or physiology concepts that the models are based on. Assumptions are explained, but often the alternatives or models actually used in the field are not discussed at all. Finally, the MATLAB code that is included is rather poor. None of the graphs have titles or labeled axes, so in order to run a simulation, you must first dig through the code for an hour to figure out what each of the plots is. They also use up to 8 or so different files for simulations, which is rather silly. Most of the stuff they're doing can be done cleanly in no more than 4 documents. There is very little commenting in the book code which makes it all the more time-consuming to follow.It might be a decent reference book for understanding some basic modeling principles, but that's about all.

The following remark was submitted to as a comment on Overstreet's review. It did not give a rating of the book - the 5 star rating is 's. The book is designed for undergraduate courses that introduce students to mathematical modeling of medical and life science systems. As stated in the Preface, students should have at least one term of calculus. While we have based graduate courses on topics presented in this book, they involve substantial supplemental materials.

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