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# Bioengineering Fundamentals



## Synopsis

Combining engineering principles with technical rigor and a problem-solving focus, this guide takes an interdisciplinary approach to the conservation laws that form the foundation of bioengineering: mass, energy, charge, and momentum. Demonstrates how conservation laws (including conservation of mass and energy, momentum, and charge) apply to biological and medical systems to lay a foundation for beginning bioengineers. Allows readers to build a mental model of how key concepts in engineering, chemistry, and physics are interrelated. Emphasizes how accounting and conservation equations are used to derive familiar laws, such as Kirchhoff's current and voltage laws, Newton's laws of motions, Bernoulli's equation, and others. Extensive examples span the breadth of modern bioengineering, including physiology, biochemistry, tissue engineering, biotechnology, and instrumentation. For anyone interested in learning more about bioengineering.

## Book Information

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## Customer Reviews

Dr. Saterbak is pretty much the mother of all Rice undergrad bioe's, and to meet a general lack of decent intro bioe textbooks at the time, she and some members of our department began to write this book. Given her experience at teaching undergrads, this book meets expectations. It is clear and well-written. It contains a lot of equations, but that's because it's an intro engineering textbook. In other words, the book is all about different kinds of balances (mass, momentum, energy, etc.). Despite this, the equations are still presented in a very logical way that was easy to refer to back then, doing all those problem sets. It still continues to be a go-to reference text. The problems,

though, are crazy difficult. They're meant to be extremely challenging, and on average, we used to get assigned only 6 from a chapter a week (it'd take 4 of us 8hrs on average). Interestingly, some other intro bioe classes mistakenly choose to assign a lot more problems a week, thinking that it's like your typical textbook with easy problems. Not the case here. Finally, the case studies at the end are a nice addition, being closely patterned after term design projects that have been tried and tested on our students in the past. They present big biomedical problems in a context that allows you to call in stuff you have learned from the rest of the book. Overall, a lot of the material will seem tedious, but in the end, you'll be surprised at your newfound capacity for analytical thinking. This book doesn't teach as much "knowledge" as it develops a skill. But of course, you've gotta do the problems...

Examples were relatively helpful, but overall important information isn't exactly obvious to find, and some overall concepts are unclear, but for the price of renting if you really need the book for your class this isn't a bad choice.

Required textbook for college, reasonable rental price but it is really worn out and looks almost broke

I found that many problems were badly worded and in some, the objectives were made clear enough. Don't expect to learn much from just reading the chapters alone.

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