Basic Transport Phenomena in Biomedical Engineering

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Basic Transport Phenomena in Biomedical Engineering, Fourth Edition, differs from other more advanced texts in this field of study in that it develops the engineering problem solving skills of undergraduate engineering students while incorporating a focused treatment on key life science concepts that are then applied towards the development and design of biomedical devices such as drug delivery systems, artificial organs, and tissue engineered implants. Chapters 1 through 8 provide the basic understanding of transport phenomena in biological systems and Chapters 9 through 11 show how this material may be used to understand and design biomedical devices. The mathematical development is clearly shown from first principles that are easy to grasp conceptually. Numerous examples and end of chapter problems allow the student to practice the concepts presented throughout the book. An emphasis is also placed on using appropriate numerical methods on a computer to solve these problems and a description of useful data analysis techniques and numerical methods using MATLAB® are discussed in Chapter 1.

In many cases the results of these examples and problems are compared to real experimental data from the research literature. Therefore, the concepts are not simply abstract or theoretical representations, but are actually used and validated. This is of key importance to the growth and development of problem solving skills for engineering students as it builds their confidence in the use of these techniques and methods that are developed in the book. Furthermore, this textbook provides an extensive bibliography from the research literature in areas such as tissue engineering, bioartificial organs, and drug delivery systems, with an emphasis on the design principles derived from transport phenomena for these devices. Hence, the reader of this book will find the topics in the book to be of immediate value and utility. Being an introductory text on transport phenomena in biomedical engineering, this book should be attractive to both upper level undergraduates and beginning graduate students in such fields as bioengineering, biomedical engineering, chemical engineering, and mechanical engineering.

- Presents a basic understanding and the theories of transport in biological systems
- Incorporates real-world applications in the development and design of artificial organs, drug delivery systems, and tissues.
- Contributes numerous examples throughout the text with a strong discussion of the numerical methods used.
- Incorporates new problems and selected complete solutions where appropriate