Transport Phenomena In Biological Systems 2nd Edition

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Transport Phenomena and Living Systems Springer Science & Business Media
A unique, accessible guide to the application of engineering methods to biological systems. Presenting for the first time a practical, design-oriented, interdisciplinary approach to transport phenomena involving biological systems, Biological Process Engineering emphasizes the common aspects of the three main transport processes-fluid flow, heat transfer, and mass transfer. In clear and simple terms, it explores the relevance of these processes to broadly defined biological systems such as the growth of microbes in bioreactors, the leaching of pollutants into groundwater, and the chemistry of food manufacturing. Reaching well beyond standard applications in medicine and the environment to areas of biotechnology, aquaculture, agriculture, and food processing, this book promotes analogical thinking that will lead to creative solutions. While keeping the mathematics to a minimum, it explains principles of effective system modeling and demonstrates a wide variety of problem-solving techniques. Readers will find: * Systems diagrams comparing and contrasting different transport processes * Biological examples for all types of systems, including metabolic pathways, locomotion, reproduction, responses to thermal conditions, and more * Numerous design charts and procedures * An extensive collection of tables of parameter values, not found in any other text. An ideal undergraduate text for biological engineering students taking courses in transport processes, Biological Process Engineering is also an excellent reference for practicing engineers. It introduces the reader to diverse biological phenomena, serves as a stepping-stone to more theoretical topics, and provides important insights into the fast-growing arena of biological engineering.

An Introduction to Fluid Mechanics and Transport Phenomena Academic Press
This book presents the foundations of fluid mechanics and transport phenomena in a concise way. It is suitable as an introduction to the subject as it contains many examples, proposed problems and a chapter for self-evaluation.

A Modern Course in Transport Phenomena Springer
Transport in Biological Media is a solid resource of mathematical models for researchers across a broad range of scientific and engineering problems such as the effects of drug delivery, chemotherapy, or insulin intake to interpret transport experiments in areas of cutting edge biological research. A wide range of emerging theoretical and experimental mathematical methodologies are offered by biological topic to appeal to individual researchers to assist them in solving problems in their specific area of research. Researchers in biology, biophysics, biomathematics, chemistry, engineers and clinical fields specific to transport modeling will find this resource indispensible. Provides detailed mathematical model development to interpret experiments and provides current modeling practices Provides a wide range of biological and clinical applications Includes physiological descriptions of models

Modeling Transport Phenomena in Porous Media with Applications CRC Press
This cutting-edge reference clearly explains pharmaceutical transport phenomena, demonstrating applications ranging from drug or nutrient uptake into vesicle or cell suspensions, drug dissolution and absorption across biological membranes, whole body kinetics, and drug release from polymer reservoirs and matrices to heat and mass transport in freeze-drying and hygroscopicity. Focuses on practical applications of drug delivery from a physical and mechanistic perspective, highlighting biological systems. Written by more than 30 international authorities in the field, Transport Processes in Pharmaceutical Systems discusses the crucial relationship between the transport process and thermodynamic factors analyzes the dynamics of diffusion at liquid-liquid, liquid-solid, and liquid-cultured cell interfaces covers prodrug design for improving membrane transport addresses the effects of external stimuli in altering some natural and synthetic polymer matrices examines properties of hydrogels, including synthesis, swelling degree, swelling kinetics, permeability, biocompatibility, and biodegradability presents mass transfer of drugs and pharmacokinetics based on mass balance descriptions and more! Containing over 1000 references and more than 1100 equations, drawings, photographs, micrographs, and tables, Transport Processes in Pharmaceutical Systems is a must-read resource for research pharmacists, pharmaceutical scientists and chemists, chemical engineers, physical chemists, and upper-level undergraduate and graduate students in these disciplines.

Problems for Biomedical Fluid Mechanics and Transport Phenomena Prentice Hall
This text provides a teachable and readable approach to transport phenomena (momentum, heat, and mass transport) by providing numerous examples and applications, which are particularly important to metallurgical, ceramic, and materials engineers. Because the authors feel that it is important for students and practicing engineers to visualize the physical situations, they have attempted to lead the reader through the development and solution of the relevant differential equations by applying the familiar principles of conservation to numerous situations and by including many worked examples in each chapter. The book is organized in a manner characteristic of other texts in transport phenomena. Section I deals with the properties and mechanics of fluid motion; Section II with thermal properties and heat transfer; and Section III with diffusion and mass transfer. The authors depart from tradition by building on a presumed understanding of the relationships between the structure and properties of matter, particularly in the chapters devoted to the transport properties (viscosity, thermal conductivity, and the diffusion coefficients). In addition, generous portions of the text, numerous examples, and many problems at the ends of the chapters apply transport phenomena to materials processing.

Transport Processes in Pharmaceutical Systems Academic Internet Pub Incorporated
This will be a substantial revision of a good selling text for upper division/first graduate courses in biomedical transport phenomena, offered in many departments of biomedical and chemical engineering. Each chapter will be updated accordingly, with new problems and examples incorporated where appropriate. A particular emphasis will be on new information related to tissue engineering and organ regeneration. A key new feature will be the inclusion of complete solutions within the body of the text, rather than in a separate solutions manual. Also, Matlab will be incorporated for the first time with this Fourth Edition.

Transport Phenomena in Materials Processing Springer
This volume is organized to highlight the parallels and the differences between the transport phenomena. It facilitates comprehension and retention of basic momentum, heat, mass and charge transport processes and properties and features a balance equation format based on systematic addition and analysis of each term in the balance equation. There are more than 1300 equations, and end-of-chapter problems are provided to reinforce important text material.

Analysis of Transport Phenomena Imperial College Press
Transporting Epithelia summarizes the progress that has been made in understanding a wide range of epithelial transport systems. This book discusses the epithelia involved in osmotic and ionic regulation from protonephridia to the mammalian kidney. It also explains the digestive and absorptive epithelia, as well as the epithelia that produce special secretions, such as milk, endolymph, aqueous humor, cerebrospinal fluid, sweat, and tears. Furthermore, this book describes the role of the epithelium in the physiology of the animal and the structure of the epithelium. Then, the structure of the epithelium is correlated with its physiological properties. This book will be valuable both for teaching and as a reference for research workers interested in comparative aspects of transport phenomena.

Transport Phenomena in Biological Systems John Wiley & Sons
For one-semester, advanced undergraduate/graduate courses in Biotransport Engineering. Presenting engineering fundamentals and biological applications in a unified way, this text provides students with the skills necessary to develop and critically analyze models of biological transport and reaction processes. It covers topics in fluid mechanics, mass transport, and biochemical interactions, with engineering concepts motivated by specific biological problems.

Continuum Analysis of Biological Systems Academic Press
This volume contains papers based on the workshop OC Energy and Information Transfer in Biological Systems: How Physics Could Enrich Biological UnderstandingOCO, held in Italy in 2002. The meeting was a forum aimed at evaluating the potential and outlooks of a modern physics approach to understanding and describing biological processes, especially regarding the transition from the microscopic chemical scenario to the macroscopic functional configurations of living matter. In this frame some leading researchers presented and discussed several basic topics, such as the photon interaction with biological systems also from the viewpoint of photon information processes and of possible applications; the influence of electromagnetic fields on the self-organization of biosystems including the nonlinear mechanism for energy transfer and storage; and the influence of the structure of water on the properties of biological matter."

Heat Transfer and Fluid Flow in Biological Processes Cambridge University Press
Introductory Biomechanics is a new, integrated text written specifically for engineering students. It provides a broad overview of this important branch of the rapidly growing field of bioengineering. A wide selection of topics is presented, ranging from the mechanics of single cells to the dynamics of human movement. No prior biological knowledge is assumed and in each chapter, the relevant anatomy and physiology are first described. The biological system is then analyzed from a mechanical viewpoint by reducing it to its essential elements, using the laws of mechanics and then tying mechanical insights back to biological function. This integrated approach provides students with a deeper understanding of both the mechanics and the biology than from qualitative study alone. The text is supported by a wealth of illustrations, tables and examples, a large selection of suitable problems and hundreds of current references, making it an essential textbook for any biomechanics course.

Chemical and Biological Processes in Fluid Flows Cambridge University Press
Many chemical and biological processes take place in fluid environments in constant motion OCo chemical reactions in the atmosphere, biological population dynamics in the ocean, chemical reactors, combustion, and microfluidic devices. Applications of concepts from the field of nonlinear dynamical systems have led to significant progress over the last decade in the theoretical understanding of complex phenomena observed in such systems. This book introduces the theoretical approaches for describing mixing and transport in fluid flows. It reviews the basic concepts of dynamical phenomena arising from the nonlinear interactions in chemical and biological systems. The coverage includes a comprehensive overview of recent results on the effect of mixing on spatial structure and the dynamics of chemically and biologically active components in fluid flows, in particular oceanic plankton dynamics. Sample Chapter(s). Chapter 1: Fluid Flows (248 KB). Contents: Fluid Flows; Mixing and Dispersion in Fluid Flows; Chemical and Ecological Models; Reaction-Diffusion Dynamics; Fast Binary Reactions and the Lamellar Approach; Decay-Type and Stable Reaction Dynamics in Flows; Mixing in Autocatalytic-Type Processes; Mixing in Oscillatory Media; Further Reading. Readership: Physicists, applied mathematicians, chemical engineers and marine ecologists.

Energy and Information Transfer in Biological Systems John Wiley & Sons
This unique resource offers over two hundred well-tested bioengineering problems for teaching and examinations. Solutions are available to instructors online.

Introductory Biomechanics Elsevier
This text is designed for a first course in biological mass transport, and the material in it is presented at a level that is appropriate to advanced undergraduates or early graduate level students. Its orientation is somewhat more physical and mathematical than a biology or standard physiology text, reflecting its origins in a transport course that I teach to undergraduate (and occasional graduate) biomedical engineering students in the Whiting School of Engineering at Johns Hopkins. The audience for my cours- and presumably for this text - also includes chemical engineering undergraduates concentrating in biotechnology, and graduate students in biophysics. The organization of this book differs from most texts that at tempt to present an engineering approach to biological transport. What distinguishes biological transport from other mass transfer processes is the fact that biological transport is biological. Thus, we do not start with the engineering principles of mass transport (which are well presented elsewhere) and then seek biological ap plications of these principles; rather, we begin with the biological processes themselves, and then develop the tools that are needed to describe them. As a result, more physiology is presented in this text than is often found in books dealing with engineering applica tions in the life sciences.

Transport Phenomena in Multiphase Systems Springer
Nano and Bio Heat Transfer and Fluid Flow focuses on the use of nanoparticles for bio application and bio-fluidics from an engineering perspective. It introduces the mechanisms underlying thermal and fluid interaction of nanoparticles with biological systems. This book will help readers translate theory into real world applications, such as drug delivery and lab-on-a-chip. The content covers how transport at the nano-scale differs from the macro-scale, also discussing what complications can arise in a biologic system at the nano-scale. It is ideal for students and early career researchers, engineers conducting experimental work on relevant applications, or those who develop computer models to investigate/design these systems. Content coverage includes biofluid mechanics, transport phenomena, micro/nano fluid flows, and heat transfer. Discusses nanoparticle applications in drug delivery Covers the engineering fundamentals of bio heat transfer and fluid flow Explains how to simulate, analyze, and evaluate the transportation of heat and mass problems in bio-systems

Transport Phenomena Fundamentals John Wiley & Sons

Never HIGHLIGHT a Book Again! Virtually all of the testable terms, concepts, persons, places, and events from the textbook are included. Cram101 Just the FACTS101 studyguides give all of the outlines, highlights, notes, and quizzes for your textbook with optional online comprehensive practice tests. Only Cram101 is Textbook Specific. Accompanys: 9780131569881 .

Equations of Membrane Biophysics CRC Press

This volume fills the need for a textbook presenting basic governing and constitutive equations, followed by several engineering problems on multiphase flow and transport that are not provided in current advanced texts, monographs, or handbooks. The unique emphasis of this book is on the sound formulation of the basic equations describing multiphase transport and how they can be used to design processes in selected industrially important fields. The clear underlying mathematical and physical bases of the interdisciplinary description of multiphase flow and transport are the main themes, along with advances in the kinetic theory for particle flow systems. The book may be used as an upper-level undergraduate or graduate textbook, as a reference by professionals in the design of processes that deal with a variety of multiphase systems, and by practitioners and experts in multiphase science in the area of computational fluid dynamics (CFD) at U.S. national laboratories, international universities, research laboratories and institutions, and in the chemical, pharmaceutical, and petroleum industries. Distinct from other books on multiphase flow, this volume shows clearly how the basic multiphase equations can be used in the design and scale-up of multiphase processes. The authors represent a combination of nearly two centuries of experience and innovative application of multiphase transport representing hundreds of publications and several books. This book serves to encapsulate the essence of their wisdom and insight, and:

Transport Phenomena in Biological Systems Newnes

A comprehensive presentation of essential topics for biological engineers, focusing on the development and application of dynamic models of biomolecular and cellular phenomena. This book describes the fundamental molecular and cellular events responsible for biological function, develops models to study biomolecular and cellular phenomena, and shows, with examples, how models are applied in the design and interpretation of experiments on biological systems. Integrating molecular cell biology with quantitative engineering analysis and design, it is the first textbook to offer a comprehensive presentation of these essential topics for chemical and biological engineering. The book systematically develops the concepts necessary to understand and study complex biological phenomena, moving from the simplest elements at the smallest scale and progressively adding complexity at the cellular organizational level, focusing on experimental testing of mechanistic hypotheses. After introducing the motivations for formulation of mathematical rate process models in biology, the text goes on to cover such topics as noncovalent binding interactions; quantitative descriptions of the transient, steady state, and equilibrium interactions of proteins and their ligands; enzyme kinetics; gene expression and protein trafficking; network dynamics; quantitative descriptions of growth dynamics; coupled transport and reaction; and discrete stochastic processes. The textbook is intended for advanced undergraduate and graduate courses in chemical engineering and bioengineering, and has been developed by the authors for classes they teach at MIT and the University of Minnesota.

Nano and Bio Heat Transfer and Fluid Flow Academic Press

Biological chemistry has changed since the completion of the human genome project. There is a renewed interest and market for individuals trained in biophysical chemistry and molecular biophysics. The Physical Basis of Biochemistry, Second Edition, emphasizes the interdisciplinary nature of biophysical chemistry by incorporating the quantitative perspective of the physical sciences without sacrificing the complexity and diversity of the biological systems, applies physical and chemical principles to the understanding of the biology of cells and explores the explosive developments in the area of genomics, and in turn, proteomics, bioinformatics, and computational and visualization technologies that have occurred in the past seven years. The book features problem sets and examples, clear illustrations, and extensive appendixes that provide additional information on related topics in mathematics, physics and chemistry.

Quantitative Fundamentals of Molecular and Cellular Bioengineering Prentice Hall

Presenting engineering fundamentals and biological applications in a unified way, this book provides learners with the skills necessary to develop and critically analyze models of biological transport and reaction processes. (Midwest).