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Professor Doran has taught bioprocess engineering and biotechnology at undergraduate and graduate levels for more than 30 years. Her most significant contributions to the field include bioreactor design and analysis for plant organ culture, foreign protein production in plant systems, and human tissue engineering using stem cells.

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being translated by a strengthening biotechnology industry into revolutionary new products and services. Many a student has been enticed by the promise of biotechnology and the excitement of being near the cutting edge of scientific advancement. However, graduates trained in molecular biology and cell manipulation soon realise that these techniques are only part of the picture. Reaping the full benefits of biotechnology requires manufacturing capability involving the large-scale processing of biological material. Increasingly, biotechnologists are being employed by companies to work in co-operation with chemical engineers to achieve pragmatic commercial goals. For many years aspects of biochemistry and molecular genetics have been included in chemical engineering curricula, yet there has



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been little attempt until recently to teach aspects of engineering applicable to process design to biotechnologists. This textbook is the first to present the principles of bioprocess engineering in a way that is accessible to biological scientists. Other texts on bioprocess engineering currently available assume that the reader already has engineering training. On the other hand, chemical engineering textbooks do not consider examples from bioprocessing, and are written almost exclusively with the petroleum and chemical industries in mind. This publication explains process analysis from an engineering point of view, but refers exclusively to the treatment of biological systems. Over 170 problems and worked examples encompass a wide range of applications, including recombinant cells, plant and

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bioprocessing-internal structure and functions of different types of microorganisms, major metabolic pathways, enzymes, microbial genetics, kinetics and stoichiometry of growth and product information-to traditional chemical engineers and those in related disciplines. It explores the engineering principles necessary for bioprocess synthesis and design, and illustrates the application of these principles to modern biotechnology for production of pharmaceuticals and biologics, solution of environmental problems, production of commodities, and medical applications.

Bioprocess Engineering involves the design and development of equipment and processes for the manufacturing of products such as food, feed, pharmaceuticals, nutraceuticals,

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chemicals, and polymers and paper from biological materials. It also deals with studying various biotechnological processes. "Bioprocess Kinetics and Systems Engineering" first of its kind contains systematic and comprehensive content on bioprocess kinetics, bioprocess systems, sustainability and reaction engineering. Dr. Shijie Liu reviews the relevant fundamentals of chemical kinetics-including batch and continuous reactors, biochemistry, microbiology, molecular biology, reaction engineering, and bioprocess systems engineering- introducing key principles that enable bioprocess engineers to engage in the analysis, optimization, design and consistent control over biological and chemical transformations. The quantitative treatment of bioprocesses is the central theme of this book, while more advanced

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techniques and applications are covered with some depth. Many theoretical derivations and simplifications are used to demonstrate how empirical kinetic models are applicable to complicated bioprocess systems. Contains extensive illustrative drawings which make the understanding of the subject easy Contains worked examples of the various process parameters, their significance and their specific practical use Provides the theory of bioprocess kinetics from simple concepts to complex metabolic pathways Incorporates sustainability concepts into the various bioprocesses

This substantially revised text represents a broader based biological engineering title. It includes medicine and other

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applications that are desired in curricula supported by the American Society of Agricultural and Biological Engineers, as well as many bioengineering departments in both U.S. and worldwide departments. This new edition will focus

Biological drug and vaccine manufacturing has quickly become one of the highest-value fields of bioprocess engineering, and many bioprocess engineers are now finding job opportunities that have traditionally gone to chemical engineers. Fundamentals of Modern Bioprocessing addresses this growing demand. Written by experts well-established in the field, this book connects the principles and applications of bioprocessing engineering to healthcare product manufacturing and expands on areas of opportunity for

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qualified bioprocess engineers and students. The book is divided into two sections: the first half centers on the engineering fundamentals of bioprocessing; while the second half serves as a handbook offering advice and practical applications. Focused on the fundamental principles at the core of this discipline, this work outlines every facet of design, component selection, and regulatory concerns. It discusses the purpose of bioprocessing (to produce products suitable for human use), describes the manufacturing technologies related to bioprocessing, and explores the rapid expansion of bioprocess engineering applications relevant to health care product manufacturing. It also considers the future of bioprocessing—the use of disposable components (which is the fastest growing area in the field of



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bioprocessing) to replace traditional stainless steel. In addition, this text: Discusses the many types of genetically modified organisms Outlines laboratory techniques Includes the most recent developments Serves as a reference and contains an extensive bibliography Emphasizes biological manufacturing using recombinant processing, which begins with creating a genetically modified organism using recombinant techniques Fundamentals of Modern Bioprocessing outlines both the principles and applications of bioprocessing engineering related to healthcare product manufacturing. It lays out the basic concepts, definitions, methods and applications of bioprocessing. A single volume comprehensive reference developed to meet the needs of students with a bioprocessing background; it can also be

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engineering principles involved in large-scale separation and purification of biological products. It is a key component of most chemical engineering/biotechnology/bioprocess engineering programmes. This book discusses the underlying principles of bioseparations engineering written from the perspective of an undergraduate course. It covers membrane based bioseparations in much more detail than some of the other books on bioseparations engineering. Based largely on the lecture notes the author developed to teach the course, this book is especially suitable for use as an undergraduate level textbook, as most other textbooks are targeted at graduate students.

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