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Bioprocess Engineering Principles | ScienceDirect

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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*Doran (Swinburne U. of Technology, Australia) revises her 1995 graduate and undergraduate textbook for students of molecular biology, biotechnology, and related disciplines who have little or no engineering background but want to become familiar with the processes by which biological discoveries are transformed into commercial products.

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Bioprocess Engineering Principles : Pauline M. Doran ...

Bioprocess Engineering Principles is a book written by Pauline M Doran. This book attempts to present the various principles behind bioprocess engineering in . Pauline M. Doran [2] Perry ' s Chemical Engineers ' Handbook, eighth ed., McGraw-Hill, [3] T.K. [7] G.C. Paul, M.A. Priede, C.R. Thomas, Relationship between morphology and citric acid production in submerged Aspergillus niger.

The emergence and refinement of techniques in molecular biology has changed our perceptions of medicine, agriculture and environmental management. Scientific breakthroughs in gene expression, protein engineering and cell fusion are 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 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 animal cell cultures, immobilised catalysts as well as traditional fermentation systems. * * First book to present the principles of bioprocess engineering in a way that is accessible to biological scientists * Explains process analysis from an engineering point of view, but uses worked examples relating to biological systems * Comprehensive, single-authored * 170 problems and worked examples encompass a wide range of applications, involving recombinant plant and animal cell cultures, immobilized catalysts, and traditional fermentation systems * 13 chapters, organized according to engineering sub-disciplines, are grouped in four sections - Introduction, Material and Energy Balances, Physical Processes, and Reactions and Reactors * Each chapter includes a set of problems and exercises for the student, key references, and a list of suggestions for further reading * Includes useful appendices, detailing conversion factors, physical and chemical property data, steam tables, mathematical rules, and a list of symbols used * Suitable for course adoption - follows closely curricula used on most bioprocessing and process biotechnology courses at senior undergraduate and graduate levels.

This welcome new edition covers bioprocess engineering principles for the reader with a limited engineering background. It explains process analysis from an engineering point of view, using worked examples and problems that relate to biological systems. Application of engineering concepts is illustrated in areas of modern biotechnology such as recombinant protein production, bioremediation, biofuels, drug development, and tissue engineering, as well as microbial fermentation. The main sub-disciplines within the engineering curriculum are all covered; Material and Energy Balances, Transport Processes, Reactions and Reactor Engineering. With new and expanded material, Doran's textbook remains the book of choice for students seeking to move into bioprocess engineering. NEW TO THIS EDITION: All chapters thoroughly revised for current developments, with over 200 pgs of new material, including significant new content in: Metabolic Engineering Sustainable Bioprocessing Membrane Filtration Turbulence and Impeller Design Downstream Processing Oxygen Transfer Systems Over 150 new problems and worked examples More than 100 new illustrations New to this edition: All chapters thoroughly revised for current developments, with over 200 pgs of new material, including significant new content in: Metabolic Engineering Sustainable Bioprocessing Membrane Filtration Turbulence and Impeller Design Downstream Processing Oxygen Transfer Systems Over 150 new problems and worked examples More than 100 new illustrations

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 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 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 used as a source for professionals in the field.

Bioprocess Engineering involves the design and development of equipment and processes for the manufacturing of products such as food, feed, pharmaceuticals, nutraceuticals, 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 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 newly updated book offers a comprehensive introduction to the scope and nature of engineering work, taking a rigorous but common sense approach to the solution of engineering problems. The text follows the planning, modelling and design phases of engineering projects through to implementation or construction, explaining the conceptual framework for undertaking projects, and then providing a range of techniques and tools for solutions. It focuses on engineering design and problem solving, but also involves economic, environmental, social and ethical considerations. This third edition expands significantly on the economic evaluation of projects and also includes a new section on intractable problems and systems, involving a discussion of wicked problems and soft systems methodology as well as the approaches to software development. Further developments include an array of additional interest boxes, worked examples, problems and up-to-date references. Case studies and real-world examples are used to illustrate the role of the engineer and especially the methods employed in engineering practice. The examples are drawn particularly from the fields of civil and environmental engineering, but the approaches and techniques are more widely applicable to other branches of engineering. The book is aimed at first-year engineering students, but contains material to suit more advanced undergraduates. It also functions as a professional handbook, covering some of the fundamentals of engineering planning and design in detail.

Product and Process Design: Driving Innovation is a comprehensive textbook for students and industrial professionals. It treats the combined design of innovative products and their innovative manufacturing processes, providing specific methods for BSc, MSc, PDEng and PhD courses. Students, industrial innovators and managers are guided through all design steps in all innovation stages (discovery, concept, feasibility, development, detailed engineering, and implementation) to successfully obtain novel products and their novel processes. The authors ' decades of innovation experience in industry, as well as in teaching BSc, MSc, and post-academic product and process design courses, thereby including the latest design publications, culminate in this book.

A groundbreaking and comprehensive reference that's been a bestseller since 1970, this new edition provides a broad mathematical survey and covers a full range of topics from the very basic to the advanced. For the first time, a personal tutor CD-ROM is included.

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

In biotechnology, the concept of recovery and product purification is different for different market sectors. Nevertheless there are many underpinning principles that may be applied at all scales of operation. This text describes those principles and their applications. Attention is directed to providing a thorough predominantly from a technology/engineering perspective enabling a greater understanding of the principles of process development.

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