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Bioprocess Engineering Basic Concepts

***Neural networks
have received a
great deal of
attention among
scientists and***

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**engineers. In
chemical
engineering,
neural
computing has
moved from
pioneering
projects toward
mainstream
industrial
applications.
This book**

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***introduces the
fundamental
principles of
neural
computing, and
is the first to
focus on its
practical
applications in
bioprocessing
and chemical
engineering.***

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**Examples,
problems, and
10 detailed case
studies
demonstrate
how to develop,
train, and apply
neural
networks. A disk
containing input
data files for all
illustrative**

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examples, case studies, and practice problems provides the opportunity for hands-on experience. An important goal of the book is to help the student or practitioner

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***learn and
implement
neural networks
quickly and
inexpensively
using
commercially
available, PC-
based software
tools. Detailed
network
specifications***

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and training procedures are included for all neural network examples discussed in the book. Each chapter contains an introduction, chapter summary,

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**references to
further reading,
practice
problems, and a
section on
nomenclature
Includes a PC-
compatible disk
containing input
data files for
examples, case
studies, and**

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**practice
problems
Presents 10
detailed case
studies Contains
an extensive
glossary,
explaining
terminology
used in neural
network
applications in**

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**science and
engineering
Provides
examples,
problems, and
ten detailed
case studies of
neural
computing
applications,
including:
Process fault-**

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**diagnosis of a
chemical reactor
Leonard Kramer
fault-
classification
problem Process
fault-diagnosis
for an unsteady-
state
continuous
stirred-tank
reactor system**

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***Classification of
protein secondary-structure
categories
Quantitative
prediction and
regression
analysis of
complex
chemical
kinetics
Software-based***

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**sensors for
quantitative
predictions of
product
compositions
from fluorescent
spectra in
bioprocessing
Quality control
and
optimization of
an autoclave**

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**curing process
for**

**manufacturing
composite
materials**

**Predictive
modeling of an
experimental
batch**

**fermentation
process**

Supervisory

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***control of the
Tennessee
Eastman
plantwide
control problem
Predictive
modeling and
optimal design
of extractive
bioseparation in
aqueous two-
phase systems***

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**A
comprehensive
presentation of
essential topics
for biological
engineers,
focusing on the
development
and application
of dynamic
models of
biomolecular**

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***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.***

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***Integrating
molecular cell
biology with
quantitative
engineering
analysis and
design, it is the
first textbook to
offer a
comprehensive
presentation of
these essential***

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**topics for
chemical and
biological
engineering.
The book
systematically
develops the
concepts
necessary to
understand and
study complex
biological**

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***phenomena,
moving from the
simplest
elements at the
smallest scale
and
progressively
adding
complexity at
the cellular
organizational
level, focusing***

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**on experimental
testing of
mechanistic
hypotheses.**

**After
introducing the
motivations for
formulation of
mathematical
rate process
models in
biology, the text**

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***goes on to cover
such topics as
noncovalent
binding
interactions;
quantitative
descriptions of
the transient,
steady state,
and equilibrium
interactions of
proteins and***

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***their ligands;
enzyme
kinetics; gene
expression and
protein
trafficking;
network
dynamics;
quantitative
descriptions of
growth
dynamics;***

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***coupled
transport and
reaction; and
discrete
stochastic
processes. The
textbook is
intended for
advanced
undergraduate
and graduate
courses in***

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**chemical
engineering and
bioengineering,
and has been
developed by
the authors for
classes they
teach at MIT
and the
University of
Minnesota.
Closes the gap**

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***between
bioscience and
mathematics-
based process
engineering
This book
presents the
most commonly
employed
approaches in
the control of
bioprocesses. It***

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***discusses the
role that control
theory plays in
understanding
the mechanisms
of cellular and
metabolic
processes, and
presents key
results in
various fields
such as dynamic***

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***modeling,
dynamic
properties of
bioprocess
models,
software
sensors
designed for the
online
estimation of
parameters and
state variables,***

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***and control and
supervision of
bioprocesses
Control in
Bioengineering
and
Bioprocessing:
Modeling,
Estimation and
the Use of
Sensors is
divided into***

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***three sections.
Part I,
Mathematical
preliminaries
and overview of
the control and
monitoring of
bioprocess,
provides a
general
overview of the
control and***

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***monitoring of
bioprocesses,
and introduces
the
mathematical
framework
necessary for
the analysis and
characterization
of bioprocess
dynamics. Part
II, Observability***

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**and control
concepts,
presents the
observability
concepts which
form the basis
of design online
estimation
algorithms
(software
sensor) for
bioprocesses,**

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***and reviews
controllability of
these concepts,
including
automatic
feedback
control systems.
Part III,
Software
sensors and
observer-based
control schemes***

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**for
bioprocesses,
features six
application
cases including
dynamic
behavior of
3-dimensional
continuous
bioreactors;
observability
analysis applied**

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***to 2D and 3D
bioreactors with
inhibitory and
non-inhibitory
models; and
regulation of a
continuously
stirred
bioreactor via
modeling error
compensation.
Applicable***

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***across all areas
of bioprocess
engineering,
including food
and beverages,
biofuels and
renewable
energy,
pharmaceuticals
and
nutraceuticals,
fermentation***

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**systems,
product
separation
technologies,
wastewater and
solid-waste
treatment
technology, and
bioremediation
Provides a clear
explanation of
the mass-**

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***balance-based
mathematical
modelling of
bioprocesses
and the main
tools for its
dynamic
analysis Offers
industry-based
applications on:
myco-diesel for
implementing***

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***"quality" of
observability;
developing a
virtual sensor
based on the
Just-In-Time
Model to
monitor
biological
control systems;
and virtual
sensor design***

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**for state
estimation in a
photocatalytic
bioreactor for
hydrogen
production
Control in
Bioengineering
and
Bioprocessing is
intended as a
foundational**

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***text for
graduate level
students in
bioengineering,
as well as a
reference text
for researchers,
engineers, and
other
practitioners
interested in
the field of***

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***estimation and
control of
bioprocesses.
This book
facilitates the
study of
problematic
chemicals in
such
applications as
chemical fate
modeling,***

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**chemical
process design,
and
experimental
design. This
volume provides
comprehensive
coverage of
modern
biochemical
engineering,
detailing the**

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***basic concepts
underlying the
behavior of
bioprocesses as
well as
advances in
bioprocess and
biochemical
engineering
science. It
combines
contemporary***

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**engineering
science with
relevant
biological
concepts in a
comprehensive
introduction to
biochemical
engineering.
This book
provides both a
rigorous view**

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***and a more
practical,
understandable
view of chemical
compounds and
biochemical
engineering and
their
applications.
Every section of
the book has
been expanded***

***where relevant
to take account
of significant
new discoveries
and realizations
of the
importance of
key concepts.
Furthermore,
emphases are
placed on the
underlying***

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***fundamentals
and on
acquisition of a
broad and
comprehensive
grasp of the
field as a whole.
Chemical and
Bioprocess
Engineering
Essentials in
Fermentation***

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**Technology
Chemical and
Biochemical
Engineering
Neural Networks
in Bioprocessing
and Chemical
Engineering
Control in
Bioprocessing**

This textbook
has been

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conceptualized
to provide a
detailed
description of
the various
aspects of
Systems and
Synthetic
Biology,
keeping the
requirements
of M.Sc. and

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Ph.D. students in mind. Also, it is hoped that this book will mentor young scientists who are willing to contribute to this area but do not know from where to

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begin. The book has been divided into two sections. The first section will deal with systems biology – in terms of the foundational understanding,

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highlighting
issues in
biological
complexity,
methods of
analysis and
various
aspects of
modelling. The
second section
deals with the
engineering

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concepts,
design
strategies of
the biological
systems
ranging from
simple DNA/RNA
fragments,
switches and
oscillators,
molecular
pathways to a

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complete
synthetic cell
will be
described.

Finally, the
book will
offer expert
opinions in
legal, safety,
security and
social issues
to present a

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well-balanced
information
both for
students and
scientists.

Bioprocess
Engineering
involves the
design and
development of
equipment and
processes for

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the manufacturing of products such as food, feed, pharmaceuticals, nutraceuticals, chemicals, and polymers and paper from biological materials. It

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also deals
with studying
various biotec
hnological
processes.

"Bioprocess
Kinetics and
Systems
Engineering"
first of its
kind contains
systematic and

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comprehensive
content on
bioprocess
kinetics,
bioprocess
systems,
sustainability
and reaction
engineering.
Dr. Shijie Liu
reviews the
relevant

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fundamentals
of chemical ki
netics-
including
batch and
continuous
reactors,
biochemistry,
microbiology,
molecular
biology,
reaction

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engineering,
and bioprocess
systems

engineering-
introducing
key principles
that enable
bioprocess
engineers to
engage in the
analysis,
optimization,

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design and consistent control over biological and chemical transformations.

The quantitative treatment of bioprocesses is the central theme of this

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book, while more advanced techniques and applications are covered with some depth. Many theoretical derivations and simplifications are used to demonstrate

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how empirical kinetic models are applicable to complicated bioprocess systems.

Contains extensive illustrative drawings which make the understanding

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of the subject
easy Contains
worked
examples of
the various
process
parameters,
their
significance
and their
specific
practical use

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Provides the theory of bioprocess kinetics from simple concepts to complex metabolic pathways
Incorporates sustainability concepts into

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the various
bioprocesses
This work
provides
comprehensive
coverage of
modern
biochemical
engineering,
detailing the
basic concepts
underlying the

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behaviour of bioprocesses as well as advances in bioprocess and biochemical engineering science. It includes discussions of topics such as enzyme

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kinetics and
biocatalysis,
microbial
growth and
product
formation,
bioreactor
design,
transport in
bioreactors,
bioproduct
recovery and

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bioprocess
economics and
design. A
solutions
manual is
available to
instructors
only.

This is the
second edition
of the text
"Bioreaction

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"Principles" by
Jens Nielsen
and John
Villadsen,
originally
published in
1994 by Plenum
Press (now
part of
Kluwer). Time
runs fast in

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Biotechnology,
and when
Kluwer Plenum
stopped
reprinting the
first edition
and asked us
to make a
second,
revised
edition we
happily

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accepted. A text on bioreactions written in the early 1990's will not reflect the enormous development of experimental as well as theoretical

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aspects of cellular reactions during the past decade. In the preface to the first edition we admitted to be newcomers in the field. One of us (JV) has

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had 10 more years of job training in biotechnology, and the younger author (IN) has now received international recognition for his work with the

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hottest topics
of "modern"
biotechnology.
Furthermore we
are happy to
have induced
Gunnar Liden,
professor of
chemical
reaction
engineering at
our sister

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university in
Lund, Sweden
to join us as
co-author of
the second
edition. His
contribution,
especially on
the chemical
engineering
aspects of
"real"

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bioreactors
has been of
the greatest
value. Chapter
8 of the
present
edition is
largely
unchanged from
the first
edition. We
wish to thank

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professor
Martin Hjortso
from LSU for
his
substantial
help with this
chapter.

Quantitative
Fundamentals
of Molecular
and Cellular
Bioengineering

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Basic Concepts
in

Turbomachinery

A Textbook for

Engineers,

Chemists and

Biologists

Bioreaction

Engineering

Principles

Systems,

Equipment and

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Facilities
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This book
presents the
select peer-
reviewed
proceedings of
the International
Conference on
Advances in
Bioprocess
Engineering and
Technology

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(ICABET 2020).

The book covers all aspects of bioprocesses, especially related to fermentation technology, food technology, environmental biotechnology, and sustainable energy. Along

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with this primary theme, the focus is on recent advances in bioprocessing research such as biosensors, micro-reactors, novel separation techniques, bioprocess control, bio-

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safety, advanced techniques for waste to wealth generation, and nanobiotechnology. This contents are divided according to the major themes of the conference:

(i) Fermentation Technology and

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Bioreactor, (ii)

Food

Pharmaceuticals
and Health care,

(iii) Environment
and Agriculture,
and (iv)

Sustainable

Energy. This

book is intended
to help students,
researchers, and

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industry professionals acquire knowledge on innovative technologies and recent advancements in the field of bioprocess engineering and technology.

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Biotechnology is
an expansive
field

incorporating
expertise in both
the life science
and engineering
disciplines. In
biotechnology,

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the scientist is concerned with developing the most favourable biocatalysts, while the engineer is directed towards process performance, defining conditions and

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strategies that will maximize the production potential of the biocatalyst.

Increasingly, the synergistic effect of the contributions of engineering and life sciences is recognised as

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key to the translation of new bioproducts from the laboratory bench to commercial bioprocess.

Fundamental to the successful realization of the bioprocess is a need for process

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engineers and life
scientists

competent in
evaluating
biological
systems from a
cross-
disciplinary
viewpoint.

Bioprocess
engineering aims
to generate core

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competencies through an understanding of the complementary biotechnology disciplines and their interdependence, and an appreciation of the challenges

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associated with the application of engineering principles in a life science context. Initial chapters focus on the microbiology, biochemistry and molecular biology that underpin

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biocatalyst
potential for
product
accumulation.
The following
chapters develop
kinetic and mass
transfer
principles that
quantify optimum
process
performance and

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scale up. The text is wide in scope, relating to bioprocesses using bacterial, fungal and enzymic biocatalysts, batch, fed-batch and continuous strategies and free and

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immobilised
configurations.

Details the
application of
chemical
engineering
principles for the
development,
design, operation
and scale up of
bioprocesses
Details the

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knowledge in
microbiology,
biochemistry and
molecular
biology relevant
to bioprocess
design, operation
and scale up
Discusses the
significance of
these life
sciences in

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defining optimum
bioprocess

performance

This concise yet

comprehensive

text introduces

the essential

concepts of

bioprocessing -

internal structure

and functions of

different types of

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microorganisms,
major metabolic
pathways,
enzymes,
microbial
genetics, kinetics
and
stoichiometry of
growth and
product
information - to
traditional

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chemical engineers and those in related disciplines. It explores the engineering principles necessary for bioprocess synthesis and design, and illustrates the

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application of these principles to modern biotechnology for production of pharmaceuticals and biologics, solution of environmental problems, production of commodities, and

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medical
applications.

BIOPROCESS
ENGINEERING

Fermentation and
Biochemical
Engineering
Handbook, 2nd
Ed.

When Cells Break
the Rules and
Hijack Their Own

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Planet
Concepts

An Introduction
to Metabolic and
Cellular
Engineering
Solutions Manual
**Textbook for junior
and senior level
majors in chemical
engineering
covering the field of
biochemical
engineering.**

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Metabolic engineering is a rapidly evolving field that is being applied for the optimization of many different industrial processes. In this issue of Advances in Biochemical Engineering/Biotechnology, developments in different areas of

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metabolic engineering are reviewed. The contributions discuss the application of metabolic engineering in the improvement of yield and productivity - illustrated by amino acid production and the production of

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**novel compounds -
in the production of
polyketides and
extension of the
substrate range -
and in the
engineering of *S.
cerevisiae* for xylose
metabolism, and the
improvement of a
complex
biotransformation
process.**

Completely revised,
Page 107/262

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updated, and enlarged, this second edition now contains a subchapter on biorecognition assays, plus a chapter on bioprocess control added by the new co-author Jun-ichi Horiuchi, who is one of the leading experts in the field.

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The central theme of the textbook remains the application of chemical engineering principles to biological processes in general, demonstrating how a chemical engineer would address and solve problems. To create a logical and

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Concepts

clear structure, the book is divided into three parts. The first deals with the basic concepts and principles of chemical engineering and can be read by those students with no prior knowledge of chemical engineering. The second part focuses

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on process aspects, such as heat and mass transfer, bioreactors, and separation methods. Finally, the third section describes practical aspects, including medical device production, downstream operations, and fermenter engineering. More

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**than 40 exemplary
solved exercises
facilitate
understanding of
the complex
engineering
background, while
self-study is
supported by the
inclusion of over 80
exercises at the end
of each chapter,
which are
supplemented by**

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the corresponding solutions. An excellent, comprehensive introduction to the principles of biochemical engineering.

This textbook takes you on a journey to the basic concepts of cancer biology. It combines developmental,

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evolutionary and cell biology perspectives, to then wrap-up with an integrated clinical approach. The book starts with an introductory chapter, looking at cancer in a nut shell. The subsequent chapters are detailed and the idea of cancer as a mass

**of somatic cells
undergoing a micro-
evolutionary
Darwinian process
is explored. Further,
the main Hanahan
and Weinberg
“Hallmarks of
Cancer” are
revisited. In most
chapters, the
fundamental
experiments that led
to key concepts,**

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**connecting basic
biology and
biomedicine are
highlighted. In the
book's closing
section all of these
concepts are
integrated in clinical
studies, where
molecular diagnosis
as well as the
various classical
and modern
therapeutic**

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strategies are addressed. The book is written in an easy-to-read language, like a one-on-one conversation between the writer and the reader, without compromising the scientific accuracy. Therefore, this book is suited not only for advanced

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**undergraduates and
master students but
also for patients or
curious lay people
looking for a further
understanding of
this shattering
disease**

**Basic Concepts
Fundamentals of
Modern
Bioprocessing
Advances in
Bioprocess**

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**Engineering and
Technology
Development,
Design, and
Implementation of
Manufacturing
Processes
Biochemical
Engineering,
Second Edition**

*Biopharmaceuti
cal
Processing:*

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*Development,
Design, and
Implementation
of
Manufacturing
Processes
covers
bioprocessing
from cell line
development to
bulk drug
substances.*

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*The methods
and strategies
described are
essential
learning for
every
scientist,
engineer or
manager in the
biopharmaceuti
cal and
vaccines*

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industry. The integrity of the bioprocess ultimately determines the quality of the product in the biotherapeutic arena, and this book covers every stage

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including all technologies related to downstream purification and upstream processing fields.

Economic considerations are included throughout,

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*with recommendations for
lowering costs
and improving
efficiencies.
Designed for
quick
reference and
easy
accessibility
of facts,
calculations*

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and
Concepts

*guidelines,
this book is
an essential
tool for
industrial
scientists and
managers in
the biopharmac
eutical
industry.
Offers a*

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comprehensive,
Concepts
go-to

*reference for
daily work
decisions*

*Covers both
upstream and
downstream
processes*

*Includes case
studies that
emphasize*

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*financial
outcomes*

*Presents
summaries,
decision
grids, graphs
and overviews
for quick
reference
For Senior-
level and
graduate*

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*courses in
Biochemical
Engineering,
and for
programs in
Agricultural
and Biological
Engineering or
Bioengineering
. This concise
yet
comprehensive*

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text
Concepts

*introduces the
essential
concepts of bi
oprocessing-
internal
structure and
functions of
different
types of micro
organisms,
major*

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*metabolic
pathways,
enzymes,
microbial
genetics,
kinetics and
stoichiometry
of growth and
product
information-to
traditional
chemical*

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engineers and those in related disciplines. It explores the engineering principles necessary for bioprocess synthesis and design, and

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*illustrates
the
application of
these
principles to
modern
biotechnology
for production
of pharmaceuti
cals and
biologics,
solution of*

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*environmental
problems,
production of
commodities,
and medical
applications.
Biological
drug and
vaccine
manufacturing
has quickly
become one of*

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*the highest-
value fields
of bioprocess
engineering,
and many
bioprocess
engineers are
now finding
job
opportunities
that have
traditionally*

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Engineering Basic
gone to
Concepts
chemical

engineers.

*Fundamentals
of Modern
Bioprocessing
addresses this
growing
demand.*

*Written by
experts well-
established in*

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Concepts

*the field,
this book
connects the
principles and
applications
of
bioprocessing
engineering to
healthcare
product
manufacturing
and expands on*

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Concepts

*areas of
opportunity
for qualified
bioprocess
engineers and
students. The
book is
divided into
two sections:
the first half
centers on the
engineering*

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*fundamentals
of
bioprocessing;
while the
second half
serves as a
handbook
offering
advice and
practical
applications.
Focused on the*

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*fundamental
principles at
the core of
this
discipline,
this work
outlines every
facet of
design,
component
selection, and
regulatory*

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concerns. It discusses the purpose of bioprocessing (to produce products suitable for human use), describes the manufacturing technologies related to

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bioprocessing, and explores the rapid expansion of bioprocess engineering applications relevant to health care product manufacturing. It also

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*considers the
future of biop
rocessing—the
use of
disposable
components
(which is the
fastest
growing area
in the field
of
bioprocessing)*

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Concepts

*to replace
traditional
stainless
steel. In
addition, this
text:*

*Discusses the
many types of
genetically
modified
organisms
Outlines*

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Engineering Basic
laboratory
Concepts
techniques

*Includes the
most recent
developments
Serves as a
reference and
contains an
extensive
bibliography
Emphasizes
biological*

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manufacturing
Concepts
using

*recombinant
processing,
which begins
with creating
a genetically
modified
organism using
recombinant
techniques*
Fundamentals

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Engineering Basic
Concepts

*of Modern
Bioprocessing
outlines both
the principles
and
applications
of
bioprocessing
engineering
related to
healthcare
product*

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Engineering Basic
Concepts

manufacturing.

*It lays out
the basic
concepts,
definitions,
methods and
applications
of
bioprocessing.*

*A single
volume
comprehensive*

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reference
Concepts

developed to meet the needs of students with a bioprocessing background; it can also be used as a source for professionals in the field.

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*Biochemical
Engineering
and
Biotechnology,
2nd Edition,
outlines the
principles of
biochemical
processes and
explains their
use in the
manufacturing*

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Concepts

of every day products. The author uses a direct approach that should be very useful for students in following the concepts and practical applications.

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Concepts

*This book is
unique in
having many
solved
problems, case
studies,
examples and
demonstrations
of detailed
experiments,
with simple
design*

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Concepts

*equations and
required
calculations.
Covers major
concepts of
biochemical
engineering
and
biotechnology,
including
applications
in*

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Concepts

*bioprocesses,
fermentation
technologies,
enzymatic
processes, and
membrane
separations,
amongst others*
*Accessible to
chemical
engineering
students who*

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*need to both
learn, and
apply,
biological
knowledge in
engineering
principals
Includes
solved
problems,
examples, and
demonstrations*

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*of detailed
experiments
with simple
design
equations and
all required
calculations
Offers many
graphs that
present actual
experimental
data, figures,*

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*and tables,
along with
explanations*

*Bioprocess
Engineering
Principles*

*An
Introduction
Heat and Mass
Transfer
Basic*

*Concepts,
Page 156/262*

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Global Edition

Putting

Biotechnology

to Work

Thirty-one

distinguished

contributors

from the major

bioprocess

engineering

firms, and

such

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Engineering Basic
biotechnology
Concepts
and

*pharmaceutical
industry*

leaders as

Hybritech,

Celltech,

Merck, and

Lilly focus on

the ... type

of equipment

required in a

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Concepts
*bib processing
plant -*

*including
fermenters,
centrifuges, c
hromatographic
columns,
synthesizing
and processing
equipment, and
such support
equipment as*

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water systems,
Concepts
steam

generators,
waste systems,
air
conditioning,
and more ...
system
components -
such as the
pumps,
filters, and

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*valves that
are ubiquitous
in bioprocess
facilities and
not limited to
certain types
of equipment
... design
issues -
covering the
planning and
design of the*

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*entire
facility and
the
requirements
of the
containment
and validation
of the
process.
For Senior-
level and
graduate*

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*courses in
Biochemical
Engineering,
and for
programs in
Agricultural
and Biological
Engineering or
Bioengineering
. This concise
yet
comprehensive*

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*introduces the
essential
concepts of bi
oprocessing--i
nternal
structure and
functions of
different
types of micro
organisms,
major*

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*metabolic
pathways,
enzymes,
microbial
genetics,
kinetics and
stoichiometry
of growth and
product inform
ation--to
traditional
chemical*

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*engineers and
those in
related
disciplines.
It explores
the
engineering
principles
necessary for
bioprocess
synthesis and
design, and*

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*illustrates
the
application of
these
principles to
modern
biotechnology
for production
of pharmaceuti
cals and
biologics,
solution of*

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*environmental
problems,
production of
commodities,
and medical
applications.
The emergence
and refinement
of techniques
in molecular
biology has
changed our*

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*perceptions of
medicine,
agriculture
and
environmental
management.
Scientific
breakthroughs
in gene
expression,
protein
engineering*

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and cell
Concepts

*fusion are
being
translated by
a
strengthening
biotechnology
industry into
revolutionary
new products
and services.
Many a student*

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has been enticed by the promise of biotechnology and the excitement of being near the cutting edge of scientific advancement. However, graduates

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*trained in
molecular
biology and
cell
manipulation
soon realise
that these
techniques are
only part of
the picture.
Reaping the
full benefits*

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of
Concepts

*biotechnology
requires
manufacturing
capability
involving the
large-scale
processing of
biological
material.*

*Increasingly,
biotechnologis*

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*ts are being
employed by
companies to
work in co-
operation with
chemical
engineers to
achieve
pragmatic
commercial
goals. For
many years*

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*aspects of
biochemistry
and molecular
genetics have
been included
in chemical
engineering
curricula, yet
there has been
little attempt
until recently
to teach*

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*aspects of
engineering
applicable to
process design
to biotechnolo
gists. This
textbook is
the first to
present the
principles of
bioprocess
engineering in*

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*a way that is
accessible to
biological
scientists.*

*Other texts on
bioprocess
engineering
currently
available
assume that
the reader
already has*

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*engineering
training. On
the other
hand, chemical
engineering
textbooks do
not consider
examples from
bioprocessing,
and are
written almost
exclusively*

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*with the
petroleum and
chemical
industries in
mind. This
publication
explains
process
analysis from
an engineering
point of view,
but refers*

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*exclusively to
the treatment
of biological
systems. Over
170 problems
and worked
examples
encompass a
wide range of
applications,
including
recombinant*

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*cells, plant
and animal
cell cultures,
immobilised
catalysts as
well as
traditional
fermentation
systems. * *
First book to
present the
principles of*

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*bioprocess
engineering in
a way that is
accessible to
biological
scientists *
Explains
process
analysis from
an engineering
point of view,
but uses*

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Engineering Basic
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worked

examples

relating to

biological

systems *

Comprehensive,

single-

authored * 170

problems and

worked

examples

encompass a

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*wide range of
applications,
involving
recombinant
plant and
animal cell
cultures,
immobilized
catalysts, and
traditional
fermentation
systems * 13*

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*chapters,
organized
according to
engineering su
b-disciplines,
are groupled
in four
sections -
Introduction,
Material and
Energy
Balances,*

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*Physical
Processes, and
Reactions and
Reactors **
*Each chapter
includes a set
of problems
and exercises
for the
student, key
references,
and a list of*

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*suggestions
for further
reading **

*Includes
useful
appendices,
detailing
conversion
factors,
physical and
chemical
property data,*

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*steam tables,
mathematical
rules, and a
list of
symbols used *
Suitable for
course
adoption -
follows
closely
curricula used
on most*

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*bioprocessing
and process
biotechnology
courses at
senior
undergraduate
and graduate
levels.*

*This textbook
teaches the
principles and
applications*

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of
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*fermentation
technology,
bioreactors,
bioprocess
variables and
their
measurement,
key product
separation and
purification
techniques as*

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*well as
bioprocess
economics in
an easy to
understand
way. The multi
disciplinary
science of
fermentation
applies
scientific and
engineering*

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*principles to
living*

*organisms or
their useful
components to
produce
products and
services
beneficial for
our society.
Successful
exploitation*

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of
Concepts

*fermentation
technology
involves
knowledge of
microbiology
and
engineering.
Thus the book
serves as a
must-have
guide for*

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*undergraduates
and graduate
students
interested in
Biochemical
Engineering
and Microbial
Biotechnology
Modeling,
Estimation and
the Use of
Soft Sensors*

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**An
Introductory
Engineering
and Life
Science
Approach
Proceedings of
[Mu] TAS 2004
8th
International
Conference on
Miniaturized**

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*Systems for
Chemistry and
Life Sciences,
Malmö, Sweden,
September
26-30, 2004
Fundamental
Concepts for
First-Year
Students
Cell Culture
Bioprocess*

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Engineering,
Concepts
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**The goal of
this textbook
is to provide
first-year
engineering
students with
a firm
grounding in
the
fundamentals**

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**of chemical
and bioprocess
engineering.**

**However,
instead of
being a
general
overview of
the two
topics,
Fundamentals
of Chemical**

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**and Bioprocess
Engineering
will identify
and focus on
specific areas
in which
attaining a
solid
competency is
desired. This
strategy is
the direct**

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**result of
studies
showing that
broad-based
courses at the
freshman level
often leave
students
grappling with
a lot of
material,
which results**

**in a low rate
of retention.
Specifically,
strong
emphasis will
be placed on
the topic of
material
balances, with
the intent
that students
exiting a**

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**course based
upon this
textbook will
be
significantly
higher on
Bloom's
Taxonomy
(knowledge,
comprehension,
application,
analysis and**

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**synthesis,
evaluation,
creation)
relating to
material
balances. In
addition, this
book also
provides
students with
a highly
developed**

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**ability to
analyze
problems from
the material
balances
perspective,
which leaves
them with
important
skills for the
future. The
textbook**

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consists of numerous exercises and their solutions. Problems are classified by their level of difficulty. Each chapter has references and selected

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**web pages to
vividly
illustrate
each example.
In addition,
to engage
students and
increase their
comprehension
and rate of
retention,
many examples**

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**involve real-
world**

situations.

**The ability of
the United
States to
sustain a
dominant
global
position in
biotechnology
lies in**

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**maintaining
its primacy in
basic life-
science
research and
developing a
strong
resource base
for bioprocess
engineering
and bioproduct
manufacturing.**

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**This book
examines the
status of
bioprocessing
and
biotechnology
in the United
States;
current
bioprocess
technology,
products, and**

**opportunities;
and challenges
of the future
and what must
be done to
meet those
challenges. It
gives recommen
dations for
action to
provide
suitable**

**incentives to
establish a
national
program in bio
process-
engineering
research,
development,
education, and
technology
transfer.
This**

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

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**desired in
curricula
supported by
the American
Society of
Agricultural
and Biological
Engineers, as
well as many
bioengineering
departments in
both U.S. and**

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**worldwide
departments.
This new
edition will
focus
Metabolic and
cellular
engineering,
as presented
in this book,
is a powerful
alliance of**

two technologies: genetics–molecular biology and fermentation technology. Both are driven by continuous refinement of the basic

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**understanding
of metabolism,
physiology and
cellular
biology
(growth,
division, diff
erentiation),
as well as the
development of
new
mathematical**

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modeling
Concepts

**techniques.
The authors'
approach is
original in
that it
integrates
several
disciplines
into a
coordinated
scheme, i.e.**

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**microbial
physiology and
bioenergetics,
thermodynamics
and enzyme
kinetics,
biomathematics
and
biochemistry,
genetics and
molecular
biology. Thus,**

it is called a transdisciplinary approach (TDA). The TDA provides the basis for the rational design of microorganisms or cells in a way that has rarely been

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**utilized to
its full
extent. Contents:
Matter and
Energy
Balances
Cell
Growth and
Metabolite
Production.
Basic Concepts
Methods of
Quantitation**

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**of Cellular
“Processes Per
formance” Dynam
ic Aspects of
Bioprocess Beh
avior Bioproc
s Development
with Plant
Cells Cellular
Engineering
Readership: Un
dergraduates,**

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**graduates and
researchers in
biomedical
engineering,
biochemistry
and
biotechnology.
Keywords: Reviews: "The book
provides very
well selected
examples that**

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**permit an easy
comprehension
of the
achievements
expected from
the different
techniques. I
consider the
book suitable
for both exper
imentalists
and**

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**theoreticians
... it also
provides an
excellent
selection of
key references
on the main
techniques
available in
the field
which are very
useful for**

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**students and
research
workers.”Marta
Cascante
Serratos
Professor of
Biochemistry
and Molecular
Biology
University of
Barcelona “A
worked example**

**towards the
end of the
book of the
use of such a
scheme was
most welcome.
The book is
aimed at final
year
undergraduates
and
postgraduate**

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**researchers
and is
suitable for
personal purch
ase."Microbiol
ogy Today
Systems and
Synthetic
Biology
Principles,
Process Design
and Equipment**

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Second Edition
Molecular and
Cell Biology
of Cancer

Written for
industrial and
academic
researchers and
development
scientists in
the life
sciences

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industry,
Bioprocessing
Technology for
Production of B
iopharmaceutica
ls and
Bioproducts is
a guide to the
tools,
approaches, and
useful
developments in
bioprocessing.

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This important
guide: •

Summarizes state
e-of-the-art
bioprocessing
methods and
reviews
applications in
life science
industries •

Includes
illustrative
case studies

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that review six
milestone bio-
products •

Discusses a wide
selection of
host strain
types and
disruptive
bioprocess
technologies

This book is
the culmination
of three

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decades of
accumulated
experience in
teaching
biotechnology
professionals.
It distills the
fundamental
principles and
essential
knowledge of
cell culture
processes from

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across many
different
disciplines and
presents them
in a series of
easy-to-follow,
comprehensive
chapters.

Practicality,
including
technological
advances and
best practices,

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is emphasized.

This second edition consists of major updates to all relevant topics contained within this work. The previous edition has been

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successfully
used in
training
courses on cell
culture
bioprocessing
over the past
seven years.

The format of
the book is
well-suited to
fast-paced
learning, such

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as is found in the intensive short course, since the key take-home messages are prominently highlighted in panels. The book is also well-suited to act as a reference guide

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for experienced
industrial
practitioners
of mammalian
cell
cultivation for
the production
of biologics.

The Eighth
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Miniaturized
Systems in

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Chemistry and
Life Science -
B5Tas 2004 - is
an annual
meeting
focusing on the
research,
development and
application of
miniaturized
technologies
and
methodologies

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in chemistry
and life
science. The
conference is
celebrating its
tenth
anniversary
after the first
workshop at the
University of
Twente, The
Netherlands in
1994. This

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research field
is rapidly
developing and
changing
towards a
domain where
core competence
areas such as
microfluidics,
micro- and
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materials
science,

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chemistry,
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medicine are
melting
together to a
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collection to
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stronger
emphasis on
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and other
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processes, ion
exchange
Discusses many
developing
topics in more
depth in mass
transfer
operations,
especially in
the biological
engineering

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area Covers in
more detail
phase
equilibrium
since
distillation
calculations
are completely
dependent on
this principle
Integrates
computational
software and

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handbook of

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presenting techniques for the commercial production of chemicals and pharmaceuticals via fermentation. Emphasis is given to unit operations fermentation, separation, purification, and recovery.

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Principles, process design, and equipment are detailed. Environment aspects are covered. The practical aspects of development, design, and operation are stressed. Theory is included to

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provide the necessary insight for a particular operation.

Problems addressed are the collection of pilot data, choice of scale-up parameters, selection of the right piece of equipment,

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pinpointing of likely trouble spots, and methods of troubleshooting. The text, written from a practical and operating viewpoint, will assist development, design, engineering and

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production
personnel in the
fermentation
industry.

Contributors
were selected
based on their
industrial
background and
orientation. The
book is illustrated
with numerous
figures,

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schematic
diagrams.

This 1998 book
introduces the
basics of
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design and
analysis for
beginning
chemical
engineering
undergraduate

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graduate
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Engineering fills
a critical need in
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Current, comprehensive, and concise, it covers bioseparations unit operations in unprecedented depth. In each of the chapters, the authors use a consistent method of explaining unit

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operations,
starting with a
qualitative
description
noting the
significance and
general
application of the
unit operation.
They then
illustrate the
scientific
application of the

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operation, develop the required mathematical theory, and finally, describe the applications of the theory in engineering practice, with an emphasis on design and scaleup. Unique

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to this text is a chapter dedicated to bioseparations process design and economics, in which a process similar, SuperPro Designer® is used to analyze and evaluate the production of

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among others, as well as revised problem sets.

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ideal for students
and professionals
working in or
studying
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and is the
premier text in
the field.

A Biological
Context, Second

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