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Preface

This third edition of *Bioprocess Engineering: Basic Principles* updates the first two editions. Although the principles of bioprocess engineering are the same, the field has moved on. The field has made considerable advances in productivity, consistency, and safety of operation.

Some of the major changes in the book since the first edition are: (1) the development of tools that have greatly increased our ability to both understand and manipulate cell biology; (2) the ability to not only control but also to genetically engineer organisms; (3) the development of new processes that have greatly improved the productivity of bioprocesses; (4) the development of new processes that have greatly improved the productivity of bioprocesses; (5) the development of new processes that have greatly improved the productivity of bioprocesses. The development of the concepts in systems and synthetic biology is also having an impact on the thinking of bioprocess engineers.

In this edition, we offer an update of several chapters of the following topics:

- The role of cells in bioprocesses
- Cell-free processes