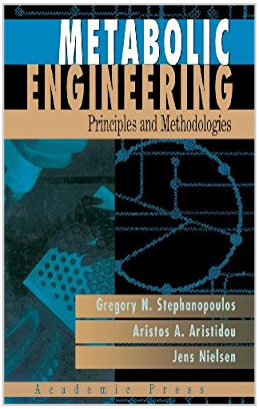


# Metabolic Engineering: Principles and Methodologies

*By Gregory N. Stephanopoulos, Aristos A. Aristidou, Jens Nielsen*



**Metabolic Engineering: Principles and Methodologies** By Gregory N. Stephanopoulos, Aristos A. Aristidou, Jens Nielsen

Metabolic engineering is a new field with applications in the production of chemicals, fuels, materials, pharmaceuticals, and medicine at the genetic level. The field's novelty is in the synthesis of molecular biology techniques and the tools of mathematical analysis, which allow rational selection of targets for genetic modification through measurements and control of metabolic fluxes. The objective is to identify specific genetics or environmental manipulations that result in improvements in yield and productivities of biotechnological processes.

Key features of the book are pathway integration and the focus on metabolic flux as a fundamental determinant of cell physiology. The book keeps mathematical complexity to a minimum, and provides a glossary of biological terms to facilitate use of the book by a broader spectrum of readers. A web page exists to communicate updates of the codes and homework problems.

- Demonstrates metabolic engineering in action with numerous examples of pathway modification
- Includes methods for identifying key enzymes in metabolic networks
- Contains a comprehensive review of metabolic biochemistry
- Discusses metabolic regulation at the gene, enzyme, operon, and cell levels
- Explains concepts of stoichiometry, kinetics, and thermodynamics of metabolic pathways
- Minimizes mathematical complexity
- Links to a Web page to communicate updates of the software code and homework problems

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## Editorial Review

From the Back Cover
Metabolic engineering is an emerging, interdisciplinary field with applications to the production of chemicals, fuels, materials, and pharmaceuticals. The field's novelty lies in the integration of the techniques of molecular biology with the tools of mathematical analysis, to help elucidate metabolic flux control and rational selection of targets for genetic modification. By providing a rigorous description of cell physiology, metabolic engineering also facilitates functional genomics. Its primary objective is to identify specific genetic and environmental manipulations that lead to enhancement of yield and productivity of biotechnological processes, or the overall improvement of cellular properties.
Key elements of the book include pathway integration and consideration of metabolic flux as a fundamental determinant of cell physiology. Metabolic Engineering keeps mathematical complexity to a minimum ,and provides sidebars as additional background on various mathematical operations. Computational tools for pathway analysis are described, and a glossary of biological terms facilitates use of the book by a broad audience of biochemists, molecular biologists, microbiologists, and biochemical/biomedical engineers.

About the Author
Gregory Stephanopoulos is a Professor of Chemical Engineering at MIT. He received his B.S. from the National Technical University of Athens, his M.S. from the University of Florida and his Ph.D. from the University of Minnesota, all in Chemical Engineering. Upon graduation, he joined the Chemical Engineering Faculty of the California Institute of Technology, where he served as Assistant and Associate Professor until 1985. In 1985 he was appointed Professor of Chemical Engineering at MIT where he has been ever since.Stephanopoulos' work has appeared in more than 150 publications and 7 patents. He has been recognized with the Dreyfus Foundation Teacher Scholar Award (1982), Excellence in Teaching Award (1984), and Technical Achievement Award of the AIChE (1984). He has been a Presidential Young Investigator and the Chairman of the Food Pharmaceutical & Bioengineering Division of the American Institute of Chemical Engineers (1992). In 1992 he was a Visiting Professor at the International Research Center for Biotechnology at Osaka University and was elected a Founding Fellow of the American Institute for Medical and Biological Engineering. In 1996 he chaired the first Conference on Metabolic Engineering and gave the inaugural Bayer Lecture on Biochemical Engineering at the University of California at Berkeley. He was honored with the FPBE Division Award at AIChE in 1997.

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