

Recent technological advances have enabled comprehensive determination of the molecular composition of living cells. The chemical interactions between many of these molecules are known, giving rise to genome-scale reconstructed biochemical reaction networks underlying cellular functions. Mathematical descriptions of the totality of these chemical interactions lead to genome-scale models that allow the computation of physiological functions.

Reflecting these recent developments, this textbook explains how such quantitative and computable genotype-phenotype relationships are built using a genome-wide basis of information about the gene portfolio of a target organism. It describes how biological knowledge is assembled to reconstruct biochemical reaction networks, the formulation of computational models of biological functions, and how these models can be used to address key biological questions and enable predictive biology.

Developed through extensive classroom use, the book is designed to provide students with a solid conceptual framework and an invaluable set of modeling tools and computational approaches.

Detailed lecture slides, along with MATLAB™ and Mathematica™ workbooks, are available for download at www.cambridge.org/sb.

Bernhard O. Palsson is the Galletti Professor of Bioengineering and Professor of Pediatrics at the University of California, San Diego. For almost 30 years, his research has focused on the development of large-scale models of biological functions and their use to solve basic and applied problems in the life sciences. He has authored three previous textbooks.

"... an insider's guided tour of the concepts, principles, and techniques underlying this emerging field. This book is brilliantly laid out and offers professors well-structured, much-needed material for a graduate-level course in systems biology and network science."

James J. Collins, MIT, Broad Institute, and Wyss Institute, USA

"... a real tour de force. With enormous clarity, Bernhard Palsson sets out the what, why, and how of network and systems biology... a masterful survey of the field by one of its leading practitioners."

Douglas Kell, The University of Manchester, UK

"... an excellent resource for familiarizing researchers and students with the process of reconstructing genome-scale metabolic models..."

Costas Maranas, The Pennsylvania State University, USA

"... a very important and novel contribution to systems biology literature... [it] will be widely used for teaching systems biology worldwide."

Jens Nielsen, Chalmers

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