



# Biosimulation: Simulation of Living Systems (Cambridge Texts in Biomedical Engineering)

By Daniel A. Beard

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## **Biosimulation: Simulation of Living Systems (Cambridge Texts in Biomedical Engineering)** By Daniel A. Beard

This practical guide to biosimulation provides the hands-on experience needed to devise, design and analyze simulations of biophysical processes for applications in biological and biomedical sciences. Through real-world case studies and worked examples, students will develop and apply basic operations through to advanced concepts, covering a wide range of biophysical topics including chemical kinetics and thermodynamics, transport phenomena, and cellular electrophysiology. Each chapter is built around case studies in a given application area, with simulations of real biological systems developed to analyze and interpret data. Open-ended project-based exercises are provided at the end of each chapter, and with all data and computer codes available online ([www.cambridge.org/biosim](http://www.cambridge.org/biosim)) students can quickly and easily run, manipulate, explore and expand on the examples inside. This hands-on guide is ideal for use on senior undergraduate/graduate courses and also as a self-study guide for anyone who needs to develop computational models of biological systems.

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#### Review

"concise, very readable textbook..overall, this is a nicely written text that focuses on the more practical aspect of biosimulation, and avoids bogging down the reader with esoteric mathematical theorems and proofs. Recommended." - M.R. King, CHOICE, December 2012

"...this publication does justice to its central aim of providing practical guidance in the development of mathematical models of biological systems. It would likely serve well as a textbook for a course addressing the main subject areas, and as a reference for researchers working in those areas who wish to build such models or better understand their construction." - Christopher R. Myers, Cornell University, Quarterly Review of Biology, June 2013

#### About the Author

Daniel A. Beard is a Professor in the Biotechnology and Bioengineering Center and the Department of Physiology at the Medical College of Wisconsin. Research in his laboratory is focused on systems engineering approaches to understanding the operation of physiological systems in health and disease. A recent major effort in his group has been on theoretical and experimental characterization of the thermodynamics, kinetics and electrophysiology of cardiac mitochondria. Additional research interests include non-equilibrium thermodynamics in biochemical networks, mass transport and microvascular exchange in physiological systems, and drug metabolism and physiologically-based pharmacokinetics.

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