



Biomolecular Feedback Systems

Domitilla Del Vecchio, Richard M. Murray

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This book provides an accessible introduction to the principles and tools for modeling, analyzing, and synthesizing biomolecular systems. It begins with modeling tools such as reaction-rate equations, reduced-order models, stochastic models, and specific models of important core processes. It then describes in detail the control and dynamical systems tools used to analyze these models. These include tools for analyzing stability of equilibria, limit cycles, robustness, and parameter uncertainty. Modeling and analysis techniques are then applied to design examples from both natural systems and synthetic biomolecular circuits. In addition, this comprehensive book addresses the problem of modular composition of synthetic circuits, the tools for analyzing the extent of modularity, and the design techniques for ensuring modular behavior. It also looks at design trade-offs, focusing on perturbations due to noise and competition for shared cellular resources.

Featuring numerous exercises and illustrations throughout, *Biomolecular Feedback Systems* is the ideal textbook for advanced undergraduates and graduate students. For researchers, it can also serve as a self-contained reference on the feedback control techniques that can be applied to biomolecular systems.

- Provides a user-friendly introduction to essential concepts, tools, and applications
- Covers the most commonly used modeling methods
- Addresses the modular design problem for biomolecular systems
- Uses design examples from both natural systems and synthetic circuits
- Solutions manual (available only to professors at press.princeton.edu)
- An online illustration package is available to professors at press.princeton.edu

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