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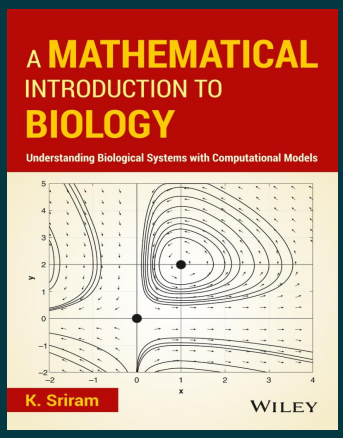

A Mathematical Introduction to Biology: Understanding Biological Systems with Computational Models

By K. Sriram

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Description

This book is perfect for a one-semester course called "Introduction to Mathematical Biology," which is a 4-credit winter course. It provides a well-organized and complete learning experience, making it great for both students and teachers in mathematical biology. Discover the dynamic intricacies of metabolic, signaling, and genetic network motifs with "A Mathematical Introduction to Biology: Understanding Biological Systems with Computational Models." This book elegantly intertwines mathematics and life sciences to reveal the roles of feedback and feedforward patterns embedded within network structures, uncovering the mechanisms that govern living systems. Customised for both students and instructors, it offers an engaging and accessible approach to bridging the gap between mathematics and biology.

Spanning 19 comprehensive chapters, this book covers essential topics such as constructing differential equation models based on the principles of mass-action kinetics and Michaelis-Menten kinetics. It delves deeply into the feedback and feedforward mechanisms that form the backbone of signaling, metabolic, and gene regulatory network motifs. By applying dynamical systems theory to adaptation models, MAPK signaling pathways, the cell division cycle, and circadian rhythms, this resource becomes indispensable for understanding biological complexity.

Problems, examples, and downloadable instructor resources—including programmable MATLAB codes and lecture slide decks for each chapter—make it an ideal companion for both independent study and classroom instruction. This book aims to the undergraduate and postgraduate students who are studying computational or mathematical biology courses and professionals working in the biotechnology and pharmaceutical industries who may find the foundational knowledge useful.

About the Author

K. Sriram

K. Sriram is an Associate Professor at IIIT-Delhi, where he has been a faculty member since 2012. Over the past 12 years, he has taught various courses in the Department of Computational Biology. He has developed courses like Systems Biology, Introduction to Mathematical Biology, Introduction to Quantitative Biology, Computational Neuroscience, Cell Biology, and Biochemistry tailored for undergraduate, postgraduate, and PhD students in the sciences and engineering disciplines. He is currently offering a course on Introduction to Mathematical Biology to master’s and PhD students of Computational Biology, and this book is the culmination of notes used in that course. His research interests lie in systems and mathematical biology, and he has published numerous papers in reputable international journals

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