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Titolo	Getting started in mathematical life sciences : from MATLAB programming to computer simulations / / Makoto Sato
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Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	1. Preparation -- 2. Introduction to MATLAB programming -- 3. Simulating time variations in life phenomena -- 4. Simulating temporal and spatial changes in biological phenomena.
Sommario/riassunto	This book helps the reader make use of the mathematical models of biological phenomena starting from the basics of programming and computer simulation. Computer simulations based on a mathematical model enable us to find a novel biological mechanism and predict an unknown biological phenomenon. Mathematical biology could further expand the progress of modern life sciences. Although many biologists are interested in mathematical biology, they do not have experience in mathematics and computer science. An educational course that combines biology, mathematics, and computer science is very rare to date. Published books for mathematical biology usually explain the theories of established mathematical models, but they do not provide a practical explanation for how to solve the differential equations included in the models, or to establish such a model that fits with a phenomenon of interest. MATLAB is an ideal programming platform for

the beginners of computer science. This book starts from the very basics about how to write a programming code for MATLAB (or Octave), explains how to solve ordinary and partial differential equations, and how to apply mathematical models to various biological phenomena such as diabetes, infectious diseases, and heartbeats. Some of them are original models, newly developed for this book. Because MATLAB codes are embedded and explained throughout the book, it will be easy to catch up with the text. In the final chapter, the book focuses on the mathematical model of the proneural wave, a phenomenon that guarantees the sequential differentiation of neurons in the brain. This model was published as a paper from the author's lab (Sato et al., PNAS 113, E5153, 2016), and was intensively explained in the book chapter "Notch Signaling in Embryology and Cancer", published by Springer in 2020. This book provides the reader who has a biological background with invaluable opportunities to learn and practice mathematical biology.
