



# Explorations of Mathematical Models in Biology with Maple

*Mazen Shahin*

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**Explorations of Mathematical Models in Biology with Maple** Mazen Shahin

**Explore and analyze the solutions of mathematical models from diverse disciplines**

As biology increasingly depends on data, algorithms, and models, it has become necessary to use a computing language, such as the user-friendly Maple™, to focus more on building and analyzing models as opposed to configuring tedious calculations. *Explorations of Mathematical Models in Biology with Maple* provides an introduction to model creation using Maple, followed by the translation, analysis, interpretation, and observation of the models.

With an integrated and interdisciplinary approach that embeds mathematical modeling into biological applications, the book illustrates numerous applications of mathematical techniques within biology, ecology, and environmental sciences. Featuring a quantitative, computational, and mathematical approach, the book includes:

- Examples of real-world applications, such as population dynamics, genetics, drug administration, interacting species, and the spread of contagious diseases, to showcase the relevancy and wide applicability of abstract mathematical techniques
- Discussion of various mathematical concepts, such as Markov chains, matrix algebra, eigenvalues, eigenvectors, first-order linear difference equations, and nonlinear first-order difference equations
- Coverage of difference equations to model a wide range of real-life discrete time situations in diverse areas as well as discussions on matrices to model linear problems
- Solutions to selected exercises and additional Maple codes

*Explorations of Mathematical Models in Biology with Maple* is an ideal textbook for undergraduate courses in mathematical models in biology, theoretical ecology, bioeconomics, forensic science, applied mathematics, and environmental science. The book is also an excellent reference for biologists, ecologists, mathematicians, biomathematicians, and environmental and resource economists.

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