Topics in Mathematical Modeling

K. K. TUNG

Topics in Mathematical Modeling is an introductory textbook on mathematical modeling. The book teaches how simple mathematics can help formulate and solve real problems of current research interest in a wide range of fields, including biology, ecology, computer science, geophysics, engineering, and the social sciences. Yet the prerequisites are minimal: calculus and elementary differential equations. Among the many topics addressed are HIV; plant phyllotaxis; global warming; the World Wide Web; plant and animal vascular networks; social networks; chaos and fractals; marriage and divorce; and El Niño. Traditional modeling topics such as predator–prey interaction, harvesting, and wars of attrition are also included. Most chapters begin with the history of a problem, follow with a demonstration of how it can be modeled using various mathematical tools, and close with a discussion of its remaining unsolved aspects.

Designed for a one-semester course, the book progresses from problems that can be solved with relatively simple mathematics to ones that require more sophisticated methods. The math techniques are taught as needed to solve the problem being addressed, and each chapter is designed to be largely independent to give teachers flexibility.

The book, which can be used as an overview and introduction to applied mathematics, is particularly suitable for sophomore, junior, and senior students in math, science, and engineering.

K. K. TUNG is Professor and Chairman of the Department of Applied Mathematics at the University of Washington. He is the author or coauthor of more than eighty research papers in atmospheric sciences and applied mathematics, and editor or chief editor of two journals in these fields.

"This book has a refreshing style that should appeal to undergraduates. Indeed, the author has produced a textbook that might well achieve his goal of teaching applied mathematics without those being taught noticing!"
—Andrew Wathen, *University of Oxford*

"With courses in mathematical modeling getting ever more popular, this book will make a valuable addition to the subject. It deals with topics that should be appealing even to students not majoring in math or science, and the level of mathematical sophistication is carefully increased throughout the book."
—Henrik Kalisch, *University of Bergen, Norway*

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