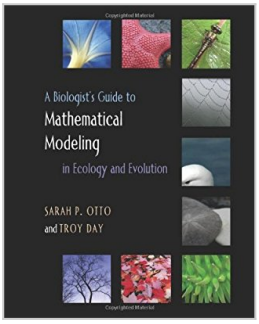

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution

By Sarah P. Otto, Troy Day

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day

Thirty years ago, biologists could get by with a rudimentary grasp of mathematics and modeling. Not so today. In seeking to answer fundamental questions about how biological systems function and change over time, the modern biologist is as likely to rely on sophisticated mathematical and computer-based models as traditional fieldwork. In this book, Sarah Otto and Troy Day provide biology students with the tools necessary to both interpret models and to build their own.

The book starts at an elementary level of mathematical modeling, assuming that the reader has had high school mathematics and first-year calculus. Otto and Day then gradually build in depth and complexity, from classic models in ecology and evolution to more intricate class-structured and probabilistic models. The authors provide primers with instructive exercises to introduce readers to the more advanced subjects of linear algebra and probability theory. Through examples, they describe how models have been used to understand such topics as the spread of HIV, chaos, the age structure of a country, speciation, and extinction.

Ecologists and evolutionary biologists today need enough mathematical training to be able to assess the power and limits of biological models and to develop theories and models themselves. This innovative book will be an indispensable guide to the world of mathematical models for the next generation of biologists.

- A how-to guide for developing new mathematical models in biology
- Provides step-by-step recipes for constructing and analyzing models
- Interesting biological applications
- Explores classical models in ecology and evolution
- Questions at the end of every chapter
- Primers cover important mathematical topics
- Exercises with answers
- Appendixes summarize useful rules
- Labs and advanced material available

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution

By Sarah P. Otto, Troy Day

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day

Thirty years ago, biologists could get by with a rudimentary grasp of mathematics and modeling. Not so today. In seeking to answer fundamental questions about how biological systems function and change over time, the modern biologist is as likely to rely on sophisticated mathematical and computer-based models as traditional fieldwork. In this book, Sarah Otto and Troy Day provide biology students with the tools necessary to both interpret models and to build their own.

The book starts at an elementary level of mathematical modeling, assuming that the reader has had high school mathematics and first-year calculus. Otto and Day then gradually build in depth and complexity, from classic models in ecology and evolution to more intricate class-structured and probabilistic models. The authors provide primers with instructive exercises to introduce readers to the more advanced subjects of linear algebra and probability theory. Through examples, they describe how models have been used to understand such topics as the spread of HIV, chaos, the age structure of a country, speciation, and extinction.

Ecologists and evolutionary biologists today need enough mathematical training to be able to assess the power and limits of biological models and to develop theories and models themselves. This innovative book will be an indispensable guide to the world of mathematical models for the next generation of biologists.

- A how-to guide for developing new mathematical models in biology
- Provides step-by-step recipes for constructing and analyzing models
- Interesting biological applications
- Explores classical models in ecology and evolution
- Questions at the end of every chapter
- Primers cover important mathematical topics
- Exercises with answers
- Appendixes summarize useful rules
- Labs and advanced material available

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day Bibliography

- Sales Rank: #418848 in Books
- Brand: imusti
- Published on: 2007-03-12
- Original language: English
- Number of items: 1
- Dimensions: 10.02" h x 1.80" w x 8.38" l, 4.06 pounds
- Binding: Hardcover
- 744 pages

Editorial Review

Review

Honorable Mention for the 2007 Best Professional/Scholarly Book in Biological Sciences, Association of American Publishers

"A gentle but thorough introduction to the mathematical techniques employed in ecological and evolutionary theory. Readers who . . . finish this well-written book will be prepared to read and understand a sizeable fraction of the current literature."**--Donald L. DeAngelis,** ***Quarterly Review of Biology***

"At long last, Sally Otto and Troy Day have provided relief for biologists and epidemiologists in search of an easily read, practical, and thorough starting point from which to learn mathematical modeling. . . . We would recommend this book over shorter texts that are labeled as 'introductory'. . . . The depth and detail that Otto and Day have included in this text arc appealing rather than intimidating, and the structure of the text is empowering rather than didactic or formulaic."**--Sanjay Basu and Alison P. Galvani,** ***Siam Review***

"[T]he great value of the Otto/Day book is that it attempts pedagogical soundness, and so is useful for teaching. Besides being perfectly readable, it engages and impresses the reader quickly not only with the subject matter, but also with the quality of printing and layout which have to be seen to be believed. These praises may sound lavish by many a reader of these columns but first see the book or better still buy the volume and you will see our passion and rage for going all out in praise of this volume."***--Current Engineering Practice***

"I highly recommend this book for every university biology department because it provides both a unique, and often uplifting, introduction and a comprehensive reference of techniques for building and analysing mathematical models."**--Volker Grimm,** ***Basic and Applied Ecology***

"I cannot help but think that future textbook authors will want to have Otto and Day front and center on the work desk, for this is a valuable source of material. . . . This book stands out, and its contribution is quite apparent. In sum, this book is a valuable contribution to the literature, and one to which I expect to refer regularly in connection with my teaching and writing duties."**--Steven G. Krantz,** ***UMAP Journal***

"[A] great textbook. . . . [M]asterful use of figures and illustrations and exercises . . . provide the reader with valuable practice in constructing models and implementing related mathematical techniques. I certainly recommend this text and can attest to its usefulness for budding researchers in the biological sciences."**--Jason M. Graham,** ***MAA Reviews***

From the Inside Flap

"A wonderfully pedagogical introduction to mathematical modeling in population biology: an ideal first course for biologists."--Simon A. Levin, Princeton University

"This book is an amazing teaching resource for developing a comprehensive understanding of the methods and importance of biological modeling. But more than that, this book should be read by every student of evolutionary biology and ecology so that they can come to a deeper appreciation of the fundamental ideas and models that underlie these fields."--Patrick C. Phillips, University of Oregon

"There is an increasing use of mathematics throughout the biological sciences, yet the training of most biologists still woefully lacks crucial mathematical tools. Sally Otto and Troy Day are themselves two masters at the deft use of theoretical models to crystallize conceptual insights about ecological and evolutionary problems, and in this wonderful book they make accessible to a broad audience the essential mathematical tool kit biologists need, both to read the literature and to craft and analyze models themselves."--Robert D. Holt, University of Florida

"I am often asked by biologists to recommend a book on mathematical modeling, but I must tell them that there is no single good book that will guide them through the difficult first stages of learning to make models. Otto and Day's book fills the gap. The quality is high throughout, the scholarship is sound, the book is comprehensive. The authors are both first-rate scientists. I think this will be a classic."--Steven A. Frank, author of *Immunology and Evolution of Infectious Disease*

"This book provides a general introduction to mathematical modeling--in particular, to population modeling--in the biological sciences. This past year I taught a 400-level course in mathematical modeling of biological systems, and I had to do so without a textbook because no adequate text existed. Otto and Day's book would have met my needs beautifully. This book is an important addition to the field."--Carl Bergstrom, University of Washington

"This book has the ambitious and worthy goal of teaching biologists enough about modeling and about mathematical methods to be both intelligent consumers of models and competent creators of their own models. Its concentration on the process of building rather than analyzing models is its strongest point."--Frederick R. Adler, author of *Modeling the Dynamics of Life: Calculus and Probability for Life Scientists*

From the Back Cover

"A wonderfully pedagogical introduction to mathematical modeling in population biology: an ideal first course for biologists."**--Simon A. Levin, Princeton University**

"This book is an amazing teaching resource for developing a comprehensive understanding of the methods and importance of biological modeling. But more than that, this book should be read by every student of evolutionary biology and ecology so that they can come to a deeper appreciation of the fundamental ideas and models that underlie these fields."**--Patrick C. Phillips, University of Oregon**

"There is an increasing use of mathematics throughout the biological sciences, yet the training of most biologists still woefully lacks crucial mathematical tools. Sally Otto and Troy Day are themselves two masters at the deft use of theoretical models to crystallize conceptual insights about ecological and evolutionary problems, and in this wonderful book they make accessible to a broad audience the essential mathematical tool kit biologists need, both to read the literature and to craft and analyze models themselves."**--Robert D. Holt, University of Florida**

"I am often asked by biologists to recommend a book on mathematical modeling, but I must tell them that there is no single good book that will guide them through the difficult first stages of learning to make models. Otto and Day's book fills the gap. The quality is high throughout, the scholarship is sound, the book is comprehensive. The authors are both first-rate scientists. I think this will be a classic."**--Steven A. Frank, author of *Immunology and Evolution of Infectious Disease***

"This book provides a general introduction to mathematical modeling--in particular, to population modeling--in the biological sciences. This past year I taught a 400-level course in mathematical modeling of biological systems, and I had to do so without a textbook because no adequate text existed. Otto and Day's book would

have met my needs beautifully. This book is an important addition to the field."**--Carl Bergstrom, University of Washington**

"This book has the ambitious and worthy goal of teaching biologists enough about modeling and about mathematical methods to be both intelligent consumers of models and competent creators of their own models. Its concentration on the process of building rather than analyzing models is its strongest point."**--Frederick R. Adler, author of *Modeling the Dynamics of Life: Calculus and Probability for Life Scientists***

Users Review

From reader reviews:

Judith Mandel:

In other case, little individuals like to read book A Biologist's Guide to Mathematical Modeling in Ecology and Evolution. You can choose the best book if you like reading a book. Given that we know about how is important the book A Biologist's Guide to Mathematical Modeling in Ecology and Evolution. You can add knowledge and of course you can around the world with a book. Absolutely right, because from book you can realize everything! From your country right up until foreign or abroad you will end up known. About simple thing until wonderful thing you could know that. In this era, we are able to open a book or searching by internet device. It is called e-book. You may use it when you feel weary to go to the library. Let's examine.

Marlys Wieland:

This A Biologist's Guide to Mathematical Modeling in Ecology and Evolution are reliable for you who want to be described as a successful person, why. The main reason of this A Biologist's Guide to Mathematical Modeling in Ecology and Evolution can be one of several great books you must have is usually giving you more than just simple reading through food but feed you actually with information that perhaps will shock your prior knowledge. This book is handy, you can bring it all over the place and whenever your conditions in the e-book and printed types. Beside that this A Biologist's Guide to Mathematical Modeling in Ecology and Evolution giving you an enormous of experience for instance rich vocabulary, giving you trial run of critical thinking that we understand it useful in your day exercise. So , let's have it and enjoy reading.

Willis Newby:

In this era globalization it is important to someone to obtain information. The information will make you to definitely understand the condition of the world. The health of the world makes the information quicker to share. You can find a lot of referrals to get information example: internet, magazine, book, and soon. You can observe that now, a lot of publisher which print many kinds of book. The book that recommended for you is A Biologist's Guide to Mathematical Modeling in Ecology and Evolution this e-book consist a lot of the information with the condition of this world now. That book was represented just how can the world has grown up. The words styles that writer value to explain it is easy to understand. The writer made some analysis when he makes this book. Here is why this book suited all of you.

Harold Dalton:

Beside this specific A Biologist's Guide to Mathematical Modeling in Ecology and Evolution in your phone, it can give you a way to get nearer to the new knowledge or info. The information and the knowledge you will got here is fresh in the oven so don't possibly be worry if you feel like an old people live in narrow community. It is good thing to have A Biologist's Guide to Mathematical Modeling in Ecology and Evolution because this book offers to your account readable information. Do you occasionally have book but you seldom get what it's exactly about. Oh come on, that would not happen if you have this within your hand. The Enjoyable agreement here cannot be questionable, similar to treasuring beautiful island. Use you still want to miss the idea? Find this book and read it from currently!

Read A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day for online ebook

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day Free PDF d0wnl0ad, audio books, books to read, good books to read, cheap books, good books, online books, books online, book reviews epub, read books online, books to read online, online library, greatbooks to read, PDF best books to read, top books to read A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day books to read online.

Online A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day ebook PDF download

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day Doc

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day Mobipocket

A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day EPub

M62A7EHKQ08: A Biologist's Guide to Mathematical Modeling in Ecology and Evolution By Sarah P. Otto, Troy Day