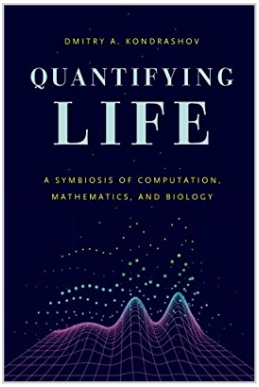

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology

By Dmitry A. Kondrashov

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology
By Dmitry A. Kondrashov

Since the time of Isaac Newton, physicists have used mathematics to describe the behavior of matter of all sizes, from subatomic particles to galaxies. In the past three decades, as advances in molecular biology have produced an avalanche of data, computational and mathematical techniques have also become necessary tools in the arsenal of biologists. But while quantitative approaches are now providing fundamental insights into biological systems, the college curriculum for biologists has not caught up, and most biology majors are never exposed to the computational and probabilistic mathematical approaches that dominate in biological research.

With *Quantifying Life*, Dmitry A. Kondrashov offers an accessible introduction to the breadth of mathematical modeling used in biology today. Assuming only a foundation in high school mathematics, *Quantifying Life* takes an innovative computational approach to developing mathematical skills and intuition. Through lessons illustrated with copious examples, mathematical and programming exercises, literature discussion questions, and computational projects of various degrees of difficulty, students build and analyze models based on current research papers and learn to implement them in the R programming language. This interplay of mathematical ideas, systematically developed programming skills, and a broad selection of biological research topics makes *Quantifying Life* an invaluable guide for seasoned life scientists and the next generation of biologists alike.

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology

By Dmitry A. Kondrashov

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov

Since the time of Isaac Newton, physicists have used mathematics to describe the behavior of matter of all sizes, from subatomic particles to galaxies. In the past three decades, as advances in molecular biology have produced an avalanche of data, computational and mathematical techniques have also become necessary tools in the arsenal of biologists. But while quantitative approaches are now providing fundamental insights into biological systems, the college curriculum for biologists has not caught up, and most biology majors are never exposed to the computational and probabilistic mathematical approaches that dominate in biological research.

With *Quantifying Life*, Dmitry A. Kondrashov offers an accessible introduction to the breadth of mathematical modeling used in biology today. Assuming only a foundation in high school mathematics, *Quantifying Life* takes an innovative computational approach to developing mathematical skills and intuition. Through lessons illustrated with copious examples, mathematical and programming exercises, literature discussion questions, and computational projects of various degrees of difficulty, students build and analyze models based on current research papers and learn to implement them in the R programming language. This interplay of mathematical ideas, systematically developed programming skills, and a broad selection of biological research topics makes *Quantifying Life* an invaluable guide for seasoned life scientists and the next generation of biologists alike.

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov Bibliography

- Rank: #989094 in Books
- Brand: Dmitry A Kondrashov
- Published on: 2016-08-04
- Released on: 2016-08-04
- Original language: English
- Number of items: 1
- Dimensions: 9.00" h x 1.40" w x 6.00" l, .0 pounds
- Binding: Paperback
- 418 pages

Editorial Review

Review

“Taking a rare modeling approach, Kondrashov covers all of the mathematics and computation that biology students need, simultaneously introducing readers to programming in R (or any language really) and focusing on computational examples. And the writing is outstanding, the best I’ve seen in a mathematics text. I love this book—I will use pieces of it in every class I teach.”
(Sarah Hews, Hampshire College)

“Very exciting, especially for life science students and those who teach biology. There is a growing need for more quantitative understanding among life scientists, and the concepts and tools provided in *Quantifying Life* are exactly the types of tools the field needs. It includes many of the standard tools of modeling but places an emphasis on stochastic processes and computation, two topics less common to many introductory modeling texts. It is unique in its inclusion of Bayesian analysis, Markov models, the use of linear algebra techniques in modeling, and a strong programming component, all designed for students with very little mathematical background. Further, the exercises place a much-needed importance on analysis of results and not just memorization of facts. The conversational style, use of real-world and modern data and examples, and hands-on approach mixing biological and mathematical background with programming in R are fantastic.”
(Hannah Callender, University of Portland)

“*Quantifying Life* . . . is an intriguing addition to the literature because of its hybrid nature: it combines some approaches to study data typically addressed in textbooks of biostatistics with others that are usually found in textbooks of mathematical biology. This approach is useful because it allows students to understand links between issues that are generally discussed in separate courses and to develop a more open mind in the numerical analysis of biological data. . . . This book deserves a space in the bookcase of people that want an introductory text to mathematical modelling in life sciences.”
(SimoneFattorini, University of L'Aquila, Italy *Biological Conservation*)

“The book has seventeen short chapters, each of which is meant to represent a week’s worth of material. Thus a big fraction of the book could be covered in a semester. Each chapter includes a bit of mathematics, necessarily quite elementary, some simple biological applications, and some computing exercises in R. The author is adamant that pencil-and-paper exercises are not enough; there has to be some computing. The students are not expected to know anything about R initially. The first exercises are extremely simple, and the complexity grows gradually as the students proceed through the book. By the end of the semester they should know a fair amount, which ought to serve them well in the future. . . . This looks to me like an improvement on the bio-calculus approach to educating biology students, and I hope this book proves to be a success.”
(David S. Watkins, Washington State University *SIAM Reviews*)

“A wonderful and highly readable text that has the potential to have a great impact on the early training of biology students. . . . *Quantifying Life* is the best source for biology students to begin their study of quantitative modeling. The strengths of *Quantifying Life* are its size, choice of content, accessibility, price, and perhaps above all its approach to computing. I am also very excited about the use of the R language over other software or programming languages. . . . If you are a serious student of biology, then I strongly

recommend to you to read *Quantifying Life*. I also believe that this book is a valuable resource for mathematicians and other quantitative scientists that find themselves working with biologists. It may prove very helpful in communicating with their collaborators in the life sciences."
(Jason M. Graham, University of Scranton *MAA Reviews*)

About the Author

Dmitry A. Kondrashov is a senior lecturer in the Biological Sciences Collegiate Division at the University of Chicago, where he developed an introductory course in quantitative modeling for biology—the origins of *Quantifying Life*. As an applied mathematician with research interests in protein structures and computational biology, he brings firsthand knowledge of the application of quantitative methods to biological problems and a passionate belief that experience with coding and mathematical skills opens new doors for young biologists.

Users Review

From reader reviews:

Michael Moore:

Here thing why that Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology are different and dependable to be yours. First of all reading a book is good but it depends in the content of the usb ports which is the content is as delightful as food or not. Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology giving you information deeper and in different ways, you can find any guide out there but there is no reserve that similar with Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology. It gives you thrill looking at journey, its open up your eyes about the thing that happened in the world which is might be can be happened around you. It is easy to bring everywhere like in area, café, or even in your technique home by train. Should you be having difficulties in bringing the imprinted book maybe the form of Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology in e-book can be your substitute.

Leonard Dail:

Do you one of people who can't read pleasant if the sentence chained within the straightway, hold on guys this particular aren't like that. This Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology book is readable by you who hate those perfect word style. You will find the information here are arrange for enjoyable looking at experience without leaving also decrease the knowledge that want to supply to you. The writer involving Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology content conveys thinking easily to understand by many individuals. The printed and e-book are not different in the articles but it just different such as it. So , do you still thinking Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology is not loveable to be your top record reading book?

Douglas Whatley:

Do you have something that you like such as book? The book lovers usually prefer to opt for book like comic, quick story and the biggest you are novel. Now, why not trying Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology that give your entertainment preference will be satisfied by simply

reading this book. Reading behavior all over the world can be said as the method for people to know world considerably better then how they react in the direction of the world. It can't be stated constantly that reading habit only for the geeky man or woman but for all of you who wants to possibly be success person. So , for all you who want to start studying as your good habit, it is possible to pick Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology become your starter.

Donna Cauley:

Reading a book make you to get more knowledge from this. You can take knowledge and information from the book. Book is published or printed or created from each source that filled update of news. In this particular modern era like currently, many ways to get information are available for you actually. From media social like newspaper, magazines, science e-book, encyclopedia, reference book, story and comic. You can add your understanding by that book. Isn't it time to spend your spare time to spread out your book? Or just looking for the Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology when you essential it?

Read Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov for online ebook

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov 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 Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov books to read online.

Online Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov ebook PDF download

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov Doc

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov Mobipocket

Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov EPub

QFCWBVSNY1U: Quantifying Life: A Symbiosis of Computation, Mathematics, and Biology By Dmitry A. Kondrashov