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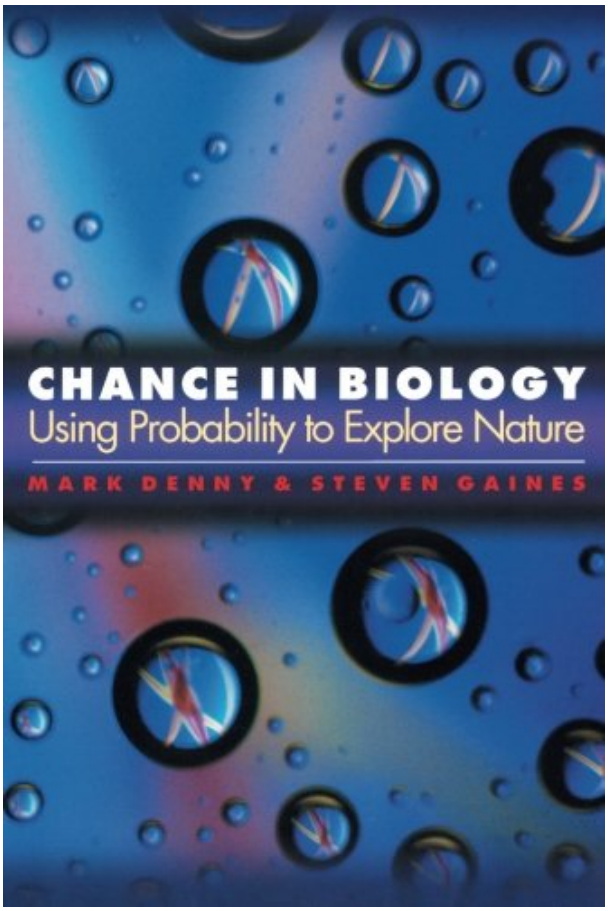

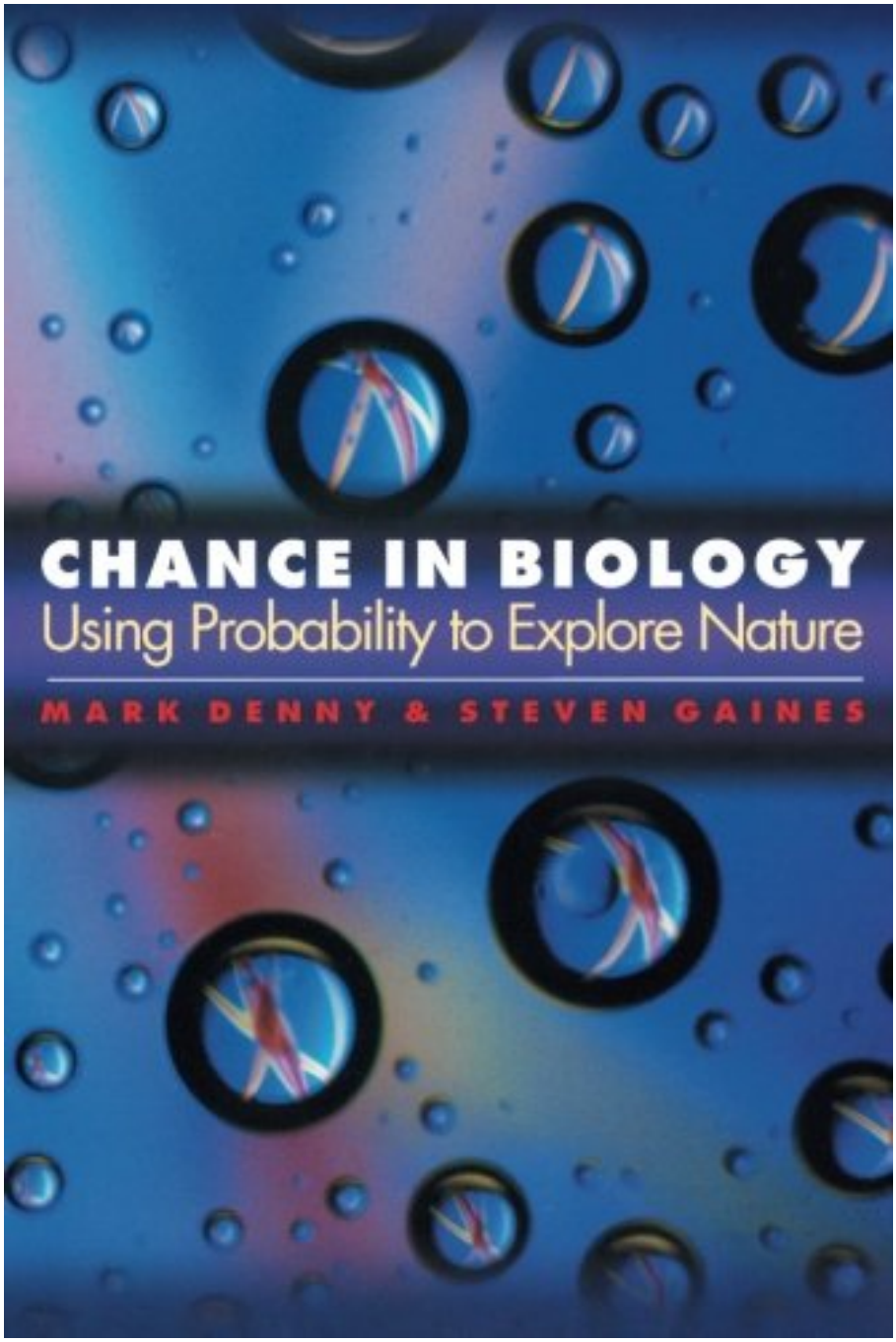

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Review

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Life is a chancy proposition: from the movement of molecules to the age at which we die, chance plays a key role in the natural world. Traditionally, biologists have viewed the inevitable "noise" of life as an unfortunate complication. The authors of this book, however, treat random processes as a benefit. In this introduction to chance in biology, Mark Denny and Steven Gaines help readers to apply the probability theory needed to make sense of chance events--using examples from ocean waves to spiderwebs, in fields ranging from molecular mechanics to evolution.

Through the application of probability theory, Denny and Gaines make predictions about how plants and animals work in a stochastic universe. Is it possible to pack a variety of ion channels into a cell membrane and have each operate at near-peak flow? Why are our arteries rubbery? The concept of a random walk provides the necessary insight. Is there an absolute upper limit to human life span? Could the sound of a cocktail party burst your eardrums? The statistics of extremes allows us to make the appropriate calculations. How long must you wait to see the detail in a moonlit landscape? Can you hear the noise of individual molecules? The authors provide answers to these and many other questions.

After an introduction to the basic statistical methods to be used in this book, the authors emphasize the application of probability theory to biology rather than the details of the theory itself. Readers with an introductory background in calculus will be able to follow the reasoning, and sets of problems, together with their solutions, are offered to reinforce concepts. The use of real-world examples, numerous illustrations, and chapter summaries--all presented with clarity and wit--make for a highly accessible text. By relating the theory of probability to the understanding of form and function in living things, the authors seek to pique the reader's curiosity about statistics and provide a new perspective on the role of chance in biology.

- Sales Rank: #2394236 in Books
- Brand: Brand: Princeton University Press
- Published on: 2002-09-23
- Released on: 2002-09-23
- Original language: English
- Number of items: 1
- Dimensions: 9.00" h x .77" w x 6.00" l, .98 pounds
- Binding: Paperback
- 312 pages

Features

- Used Book in Good Condition

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Most helpful customer reviews

17 of 18 people found the following review helpful.
Math Applied to Biology
By A Customer
Chance in Biology is one of the best science books I have ever read (and I have read quite a few of them). This book applies probability theory (along with other topics in math and physics) to biological phenomena. A big PLUS for this book is that the authors intentionally wrote the book to be accessible to an educated but nonspecialized audience.
I really enjoyed the authors' discussion of random walks applied to 'genetic drift' (the likelihood that offsprings' genomes will be different than their parents') and a surprising application of probability theory to elastic materials found in nature.
I also enjoyed their chapter on the probability of extreme phenomena -- which is an obviously useful topic that gets short shrift in many probability and statistics books I have seen. They even use baseball statistics in that chapter!
Another interesting part of this book was the discussion and the practice problems dealing with Bayes' Theorem. The concepts discussed in this book is something that all health care officials and lawyers should familiarize themselves with.
Some caveats about the book:
(a) The reader should be familiar with the 1st year of college calculus. While it is is possible that someone with only an understanding of algebra can get a lot out of the book, the calculus would help. I should note that you do not need to know a lot of calculus and someone who is 'mathophobic' could still get a lot out of the book.
(b) This book does not deal too much with inferential statistics. This book focuses in on probability, which is the cornerstone of statistics. However, when it does touch upon inferential statistics, it does a superb job.
(c) I wish the authors spent a little bit of time going over Markov Chains (random walks is a type of Markov Chain and the book does deal with that but without talking about MC explicitly). But that is a minor complaint.
Rounding out my praise for this book is the fact that most of the chapters have practice problems and ALL of the problems have solutions to them at the back of the book. I can't even begin to tell you how great having all of the solutions for all of the problems is for self-study/comprehension. The problems provided are no 'toy problems' either ... they are actually extremely helpful in not only testing one's grasps of the materials but also in illuminating and extending the points made in the particular chapter.
Other miscellanous positive things about *Chance in Biology*:
- a sample MATLAB program to simulate random phenomenon (in the solution to one of the practice problems)
- a chapter that deals with 'noise' .... interesting for those interested in Chaos
- authors make an excellent distinction between non-deterministic random/stochastic phenomena vs. deterministic Chaos
- many more good things!!!
Bottom-line: If you are at all interested in probability, applied math, physics, chemistry, or biology, you should buy this book.

5 of 5 people found the following review helpful.
Biology illuminated by physics
By Vincent P. Gutschick
Biology progressed from natural history to its great depth and breadth in part from the inclusion of truly quantitative ideas from math, physics, and chemistry. The mantle of greatest expositor of these ideas in recent times may have passed from Stephen Vogel (his excellent books are well worth reading) to Mark Denny. Here, with Steven Gaines, he takes us into extreme events, the limits of our ability to hear and to see, the elasticity of spider silk, and more. The math is demanding, but it should be; Denny and Gaines make no

bones about it, but reward the reader. Denny's book, Air and Water, is equally a pleasure to read.

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