



The Geometry of Biological Time (Interdisciplinary Applied Mathematics)

By Arthur T. Winfree



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Dealing with dynamics of processes that repeat themselves regularly, this revised and updated edition extends the thread from 1980 to the present day, concentrating on areas of interest where there will be much activity in the future. This involves going through spatial biochemical, electrophysiological, and organismic dynamical systems and patterns that were discovered by pursuing the theme of phase singularities introduced in the original book. In particular the work on excitability in cell membranes will be thoroughly updated as will the references throughout the book.

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Editorial Review

Review

From the reviews:

"This book is a wonderful exposition about his life's work and is presented with such clarity that the reader gains an insight into details of his manner of thinking...the reader is taken on a quest to solve biological mysteries and travels from the intricate beginnings of formulating the questions, through the apices and troughs of analyzing, and on to the discovery of the holy grail, that which yields biological predictions and answers. One leaves with a sense of understanding that hopefully can be applied to one's own work...this book could easily serve a dual purpose. First, through the introduction of basic mathematical concepts such as topology combined with modeling, the book serves as an introduction helping the non-applied reader to see the beauty of mathematical modeling. Second, because Winfree explains the modeling process very thoroughly, instead of just presenting equations, the book can serve as a medium for the medical professional to acquire an understanding of the modeling process. A wonderful accomplishment...I am proud to have this book on my shelf and consider it...a seminal text in mathematical modeling. This is a text that every first year graduate student should look at in some detail." (*Mathematical Reviews*)

"The new edition of The Geometry of Biological Time is a fascinating update of the delightful original. This new edition contains thoughtful commentary on new developments in the field, adding a historical and sociological dimension to the original book's elegant and unifying treatment of biological problems involving processes that repeat themselves regularly, i.e. involve 'rhythmic return through a cycle of change.' The book is an enjoyable page-turner, even for those readers with only a passing interest in biology, and demonstrates well the synergistic effect between biology and mathematics. ...

The term 'page-turner' may seem unusual in mathematics; however, it is appropriate here. Not only is the reader continually tantalized by the figures appearing on the ensuing pages, but the new commentary lends a mystery-novel feeling to the book. This second edition was created by inserting new text boxes into the original, mostly intact, edition. This style leads to a fascinating historical picture. For example, the text, '(...In the latter cases the periodicity approximation gets worse closer to the pivot. I wish here to sweep such matters under the rug (in 1978))' is followed by a new text box that begins, 'The bulge under the rug grew and grew...', continuing with a description of developments over the last two decades. The plot continues even now, with descriptions of the last twenty years often followed in the book by descriptions of current puzzles. In summary, the original book is good and the second edition is even better; the historical commentary is fascinating, and there are also a few reorganized and new chapters presenting additional biological examples." (*MAA Online*)

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Michelle Morrow:

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