Dynamics Of Life Biology

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Quantum Aspects of Life - Derek Abbott 2008-09-12
This book presents the hotly debated question of whether quantum mechanics plays a non-trivial role in biology. In a timely way, it sets out a distinct quantum biology agenda. The burgeoning fields of nanotechnology, biotechnology, quantum technology, and quantum information processing are now strongly converging. The acronym BINS, for Bio-Info-Nano-Systems, has been coined to describe the synergetic interface of these several disciplines. The living cell is an information replicating and processing system that is replete with naturally-evolved nanomachines, which at some level require a quantum mechanical description. As quantum engineering and nanotechnology meet, increasing use will be made of biological structures, or hybrids of biological and fabricated systems, for producing novel devices for information storage and processing and other tasks. An understanding of these systems at a quantum mechanical level will be indispensable. Contents:Foreword (Sir R Penrose)Emergence and Complexity:A Quantum Origin of Life? (P C W Davies)Quantum Mechanics and Emergence (S Lloyd)Quantum Mechanisms in Biology:Quantum Coherence and the Search for the First Replicator (J Al-Khalili & J McFadden)Ultrafast Quantum Dynamics in Photosynthesis (A O Castro, F F Olsen, C F Lee & N F Johnson)Modelling Quantum Decoherence in Biomolecules (J Bothma, J Gilmore & R H McKenzie)The Biological Evidence:Molecular Evolution: A Role for Quantum Mechanics in the Dynamics of Molecular Machines that Read and Write DNA (A Goel)Memory Depends on the Cytoskeleton, but is it Quantum? (A Mershin & D V Nanopoulos)Quantum Metabolism and Allometric Scaling Relations in Biology (L Demetrius)Spectroscopy of the Genetic Code (J D Bashford & P D Jarvis)Towards Understanding the Origin of Genetic Languages (A D Patel)Artificial Quantum Life:Can Arbitrary Quantum Systems Undergo Self-Replication? (A K Pati & S L Braunstein)A Semi-Quantum Version of the Game of Life (A P Flitney & D Abbott)Evolutionary Stability in Quantum Games (A Iqbal & T Cheon)Quantum Transmemetic Intelligence (E W Piotrowski & J S≈adkowski)The Debate:Dreams versus Reality: Plenary Debate Session on Quantum Computing (For Panel: C M Caves, D Lidar, H Brandt, A R Hamilton, Against Panel: D K Ferry, J Gea-Banacloche, S M Bezrukov, L B Kish, Debate Chair: C R Doering, Transcript Editor: D Abbott)Plenary Debate: Quantum Effects in Biology: Trivial or Not? (For Panel: P C W Davies, S Hameroff, A Zeilinger, D Abbott, Against Panel: J Eisert, H M Wiseman, S M Bezrukov, H Frauenfelder, Debate Chair: J Gea-Banacloche, Transcript Editor: D Abbott)Nontrivial Quantum Effects in Biology: A Skeptical Physicist's View (H Wiseman & J Eisert)That's Life! — The Geometry of π Electron Clouds (S Hameroff) Readership: Graduate students and researchers in quantum physics, biophysics, nanosciences, quantum chemistry, mathematical biology and complexity theory, as well as philosophers of science. Keywords:Quantum Biology;Quantum Computation;Quantum Mechanics;Biophysics;Nanotechnology;Quantum Technology;Quantum Information Processing;Bio-Info-Nano-Systems (BINS);Emergence;Complexity;Complex Systems;Cellular Automata;Game Theory;Biomolecules;Photosynthesis;DNA;Genetic Code;DecoherenceKey Features:Is structured in a debate style, where contributors argue opposing positionsBrings together some of the finest minds and latest developments in the fieldIs entirely unique and there are no competing titles

Glencoe Biology: The Dynamics of Life, Laboratory Manual, Student Edition - McGraw-Hill Education 2003-06-12
Biology: The Dynamics of Life, Laboratory Manual

Chaos in Ecology - J. M. Cushing 2003
Chaos in Ecology is a convincing demonstration of chaos in a biological population. The book synthesizes an ecologically focused interdisciplinary blend of non-linear dynamics theory, statistics, and experimentation yielding results of uncommon clarity and rigor. Topics include fundamental issues that are of general and widespread importance to population biology and ecology. Detailed descriptions are included of the mathematical, statistical, and experimental steps they used to explore nonlinear dynamics in ecology. Beginning with a brief overview of chaos theory and its implications for ecology. The book continues by deriving and rigorously testing a mathematical model that is closely wedded to biological mechanisms of their research organism. Therefrom were generated a variety of predictions that are fundamental to chaos theory and experiments were designed and analyzed to test those predictions. Discussion of patterns in chaos and how they can be investigated using real data follows and book ends with a discussion of the salient lessons learned from this research program Book jacket.

Gas Bubble Dynamics in the Human Body - Saul Goldman 2017-09-28
Gas Bubble Dynamics in the Human Body provides a broad range of professionals, from physicians working in a clinic, hospital or hyperbaric facility, to physical scientists trying to understand and predict the dynamics of gas bubble behavior in the body, with an interdisciplinary perspective on gas-bubble disease. Both iatrogenic and decompression-induced gas bubbles are considered. The basic medical and physiological aspects are described first, in plain language, with numerous illustrations that facilitate an intuitive grasp of the basic underlying medicine and physiology. Current issues in the field, particularly microbubbles and microparticles, and their possible role in gas-bubble disease are included. The physical and mathematical material is given at several levels of sophistication, with the "hard-core" math separated out in sections labelled "For the Math Mavens", so that the basic concepts can be grasped at a descriptive level. The field is large and multi-disciplinary, so that some of the discussion that is at a greater depth is given separately in sections labelled "In Greater Detail". Skipping these sections for whatever reason, shouldn’t materially hamper acquiring an overall appreciation of the field. Demonstrates how physical and mathematical tools help to solve underlying problems across physiology and medicine Helps researchers extend their competence and flexibility to the point that they can personally contribute to the field of hyperbaric medicine and physiology, or to other related biological problems that may interest them Provides clinicians with explicit examples of how mathematical modelling can be integrated into clinical treatment and decision-making

Biology - 2004

Biology - Alton Biggs 2003-01-01

Plant Strategies and the Dynamics and Structure of Plant Communities. (MPB-26), Volume 26 - David Tilman 2020-03-31
Although ecologists have long considered morphology and life history to be important determinants of the distribution, abundance, and dynamics of plants in nature, this book contains the first theory to predict explicitly both the evolution of plant traits and the effects of these traits on plant community structure and dynamics. David Tilman focuses on the universal requirement of terrestrial plants for both below-ground and above-ground resources. The physical separation of these resources means that plants face an unavoidable tradeoff. To obtain a higher proportion of one resource, a plant must allocate more of its growth to the structures involved in its acquisition, and thus necessarily obtain a lower proportion of another resource. Professor Tilman presents a simple theory that includes this constraint and tradeoff, and uses the theory to explore the evolution of plant life histories and morphologies along productivity and disturbance gradients. The book shows that relative growth rate, which is predicted to be strongly influenced by a plant's proportional allocation to leaves, is a major determinant of the transient dynamics of competition. These dynamics may explain the differences

between successions on poor versus rich soils and suggest that most field experiments performed to date have been of too short a duration to allow unambiguous interpretation of their results.

Lab Dynamics - Carl M. Cohen 2005

Lab Dynamics is a book about the challenges of doing science and dealing with the individuals involved, including oneself. This book addresses a subject of direct importance to lab heads, postdocs, students, and managers concerned about improving the effectiveness of academic and industrial research.

Biology: The Dynamics Of Life, Forsenics and Biotechnology Lab Manual - McGraw-Hill 2003-06-10

Biology - Glencoe/McGraw-Hill 1998-01-01

Meta-Ecosystem Dynamics - Frederic Guichard 2021-09-25

This book presents current meta-ecosystem models and their derivation from classical ecosystem and metapopulation theories. Specifically, it reviews recent modelling efforts that have emphasized the role of nonlinear dynamics on spatial and food web networks, and which have cast their implications within the context of spatial synchrony and ecological stoichiometry. It suggests that these recent advances naturally lead to a generalization of meta-ecosystem theories to spatial fluxes of matter that have both a trophic and non-trophic impact on species. Ecosystem dynamics refers to the cycling of matter and energy across ecological compartments through processes such as consumption and recycling. Spatial dynamics established its ecological roots with metapopulation theories and focuses on scaling up local ecological processes through the limited movement of individuals and matter. Over the last 15 years, theories integrating ecosystem and spatial dynamics have quickly coalesced into meta-ecosystem theories, the focus of this book. The book will be of interest to graduate students and researchers who wish to learn more about the synthesis of ecosystem and spatial dynamics, which form the foundation of the theory of meta-ecosystems.

Biology - 2002

Nuclear Architecture and Dynamics - Christophe Lavelle 2017-10-27

Nuclear Architecture and Dynamics provides a definitive resource for (bio)physicists and molecular and cellular biologists whose research involves an understanding of the organization of the genome and the mechanisms of its proper reading, maintenance, and replication by the cell. This book brings together the biochemical and physical characteristics of genome organization, providing a relevant framework in which to interpret the control of gene expression and cell differentiation. It includes work from a group of international experts, including biologists, physicists, mathematicians, and bioinformaticians who have come together for a comprehensive presentation of the current developments in the nuclear dynamics and architecture field. The book provides the uninitiated with an entry point to a highly dynamic, but complex issue, and the expert with an opportunity to have a fresh look at the viewpoints advocated by researchers from different disciplines. Highlights the link between the (bio)chemistry and the (bio)physics of chromatin Deciphers the complex interplay between numerous biochemical factors at task in the nucleus and the physical state of chromatin Provides a collective view of the field by a large, diverse group of authors with both physics and biology backgrounds

Water in Biological and Chemical Processes - Biman Bagchi 2013-11-14

A unified overview of the dynamical properties of water and its unique and diverse role in biological and chemical processes.

Biology The Dynamics of Life (Disc4). - 2001

Glencoe Biology, Student Edition - McGraw-Hill Education 2008-01-30

Join the Zebra stampede with the program that’s uniquely organized around major Themes, Big Ideas, and Main Ideas!

Glencoe Biology: The Dynamics of Life, Reinforcement and Study Guide, Student Edition - McGraw-Hill Education 2003-06-12

Study Guide and Reinforcement Worksheets allow for differentiated instruction through a wide range of question formats. There are worksheets and study tools for each section of the text that help teachers track students' progress toward understanding concepts. Guided Reading Activities help students identify and comprehend the important information in each chapter.

Evolutionary Dynamics - Martin A. Nowak 2006-09-29

At a time of unprecedented expansion in the life sciences, evolution is the one theory that transcends all of biology. Any observation of a living system must ultimately be interpreted in the context of its evolution. Evolutionary change is the consequence of mutation and natural selection, which are two concepts that can be described by mathematical equations. Evolutionary Dynamics is concerned with these equations of life. In this book, Martin A. Nowak draws on the languages of biology and mathematics to outline the mathematical principles according to which life evolves. His work introduces readers to the powerful yet simple laws that govern the evolution of living systems, no matter how complicated they might seem. Evolution has become a mathematical theory, Nowak suggests, and any idea of an evolutionary process or mechanism should be studied in the context of the mathematical equations of evolutionary dynamics. His book presents a range of analytical tools that can be used to this end: fitness landscapes, mutation matrices, genomic sequence space, random drift, quasispecies, replicators, the Prisoner’s Dilemma, games in finite and infinite populations, evolutionary graph theory, games on grids, evolutionary kaleidoscopes, fractals, and spatial chaos. Nowak then shows how evolutionary dynamics applies to critical real-world problems, including the progression of viral diseases such as AIDS, the virulence of infectious agents, the unpredictable mutations that lead to cancer, the evolution of altruism, and even the evolution of human language. His book makes a clear and compelling case for understanding every living system—and everything that arises as a consequence of living systems—in terms of evolutionary dynamics.

The Dynamics of Biological Systems - Arianna Bianchi 2019-10-02

The book presents nine mini-courses from a summer school, Dynamics of Biological Systems, held at the University of Alberta in 2016, as part of the prestigious seminar series: Séminaire de Mathématiques Supérieures (SMS). It includes new and significant contributions in the field of Dynamical Systems and their applications in Biology, Ecology, and Medicine. The chapters of this book cover a wide range of mathematical methods and biological applications. They - explain the process of mathematical modelling of biological systems with many examples, - introduce advanced methods from dynamical systems theory, - present many examples of the use of mathematical modelling to gain biological insight - discuss innovative methods for the analysis of biological processes, - contain extensive lists of references, which allow interested readers to continue the research on their own. Integrating the theory of dynamical systems with biological modelling, the book will appeal to researchers and graduate students in Applied Mathematics and Life Sciences.

Molecules, Dynamics, and Life - A. Babloyantz 1986-10-14

This book tells the story of how inert matter can acquire self-organizing and other properties ascribed to life. The author's multidisciplinary approach does not require knowledge of chemistry, physics, or biology on the part of the reader. Part I covers the properties of matter and evolutionary criteria. Part II presents an introduction to the necessary chemical concepts. Part III explains the self-organization of biosystems and the development of organisms.

Population Dynamics of the Reef Crisis - 2020-11-13

Population Dynamics of the Reef Crisis, Volume 87 in the Advances in Marine Biology series, updates on many topics that will appeal to postgraduates and researchers in marine biology, fisheries science, ecology, zoology and biological oceanography. Chapters in this new release cover SCTL disease and coral population dynamics in S-Florida, Spatial dynamics of juvenile corals in the Persian/Arabian Gulf, Surprising stability in sea urchin populations following shifts to algal dominance on heavily bleached reefs, Biophysical model of population connectivity in the Persian Gulf, Population dynamics of 20-year decline in clownfish anemones on coral reefs at Eilat, northern Red Sea, and much more. Reviews articles on the latest advances in marine biology Authored by leading figures in their respective fields of study Presents materials that are widely used by managers, students and academic professionals in the marine sciences

Biological Complexity and the Dynamics of Life Processes - J. Ricard 1999-11-01

The aim of this book is to show how supramolecular complexity of cell organization can dramatically alter the functions of individual macromolecules within a cell. The emergence of new functions which appear as a consequence of supramolecular complexity, is explained in terms of physical chemistry. The book is interdisciplinary, at the border between cell biochemistry, physics and physical chemistry. This interdisciplinarity does not result in the use of physical techniques but from the use of physical concepts to study biological problems. In the domain of complexity studies, most works are purely theoretical or based

on computer simulation. The present book is partly theoretical, partly experimental and theory is always based on experimental results. Moreover, the book encompasses in a unified manner the dynamic aspects of many different biological fields ranging from dynamics to pattern emergence in a young embryo. The volume puts emphasis on dynamic physical studies of biological events. It also develops, in a unified perspective, this new interdisciplinary approach of various important problems of cell biology and chemistry, ranging from enzyme dynamics to pattern formation during embryo development, thus paving the way to what may become a central issue of future biology.

Glencoe Biology: The Dynamics of Life, Reading Essentials, Student Edition - McGraw-Hill Education 2005-01-04

Reading Essentials provides an interactive reading experience to improve student comprehension of science content. It makes lesson content more accessible to struggling students and supports goals for differentiated instruction. Students can highlight text and take notes right in the book!

Dynamical Models in Biology - Miklós Farkas 2001-06-15

Dynamic Models in Biology offers an introduction to modern mathematical biology. This book provides a short introduction to modern mathematical methods in modeling dynamical phenomena and treats the broad topics of population dynamics, epidemiology, evolution, immunology, morphogenesis, and pattern formation. Primarily employing differential equations, the author presents accessible descriptions of difficult mathematical models. Recent mathematical results are included, but the author's presentation gives intuitive meaning to all the main formulae. Besides mathematicians who want to get acquainted with this relatively new field of applications, this book is useful for physicians, biologists, agricultural engineers, and environmentalists. Key Topics Include: Chaotic dynamics of populations The spread of sexually transmitted diseases Problems of the origin of life Models of immunology Formation of animal hide patterns The intuitive meaning of mathematical formulae explained with many figures Applying new mathematical results in modeling biological phenomena Miklos Farkas is a professor at Budapest University of Technology where he has researched and instructed mathematics for over thirty years. He has taught at universities in the former Soviet Union, Canada, Australia, Venezuela, Nigeria, India, and Columbia. Prof. Farkas received the 1999 Bolyai Award of the Hungarian Academy of Science and the 2001 Albert Szentgyorgyi Award of the Hungarian Ministry of Education. A 'down-to-earth' introduction to the growing field of modern mathematical biology Also includes appendices which provide background material that goes beyond advanced calculus and linear algebra

Biology California Edition: The Dynamics of Life - Alton Biggs 2004-04-09

Biology - Biggsm M. S. 2000

Life as a Geological Force - Pieter Westbroek 1992

Those who funded the sciences of geology 150 years ago intuitively saw the Earth as a unified whole. Since that time, the sciences have specialized into physics, chemistry, biology and geology - specialization that has brought advances, but has unfortunately obscured our view of the unique role that life and death play on our planet.

Modeling the Dynamics of Life: Calculus and Probability for Life Scientists - Frederick R. Adler 2012-01-01

Designed to help life sciences students understand the role mathematics has played in breakthroughs in epidemiology, genetics, statistics, physiology, and other biological areas, MODELING THE DYNAMCICS OF LIFE: CALCULUS AND PROBABILTY FOR LIFE SCIENTISTS, Third Edition, provides students with a thorough grounding in mathematics, the language, and 'the technology of thought' with which these developments are created and controlled. The text teaches the skills of describing a system, translating appropriate aspects into equations, and interpreting the results in terms of the original problem. The text helps unify biology by identifying dynamical principles that underlie a great diversity of biological processes. Standard topics from calculus courses are covered, with particular emphasis on those areas connected with modeling such as discrete-time dynamical systems, differential equations, and probability and statistics. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Biology - Alton L. Biggs 1998

Glencoe Biology, Student Edition - McGraw-Hill Education 2016-06-06

Biology - Alton Biggs 2011-05-26

Concepts of Biology - Samantha Fowler 2018-01-07

Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students understand--and apply--key concepts.

Modeling the Dynamics of Life: Calculus and Probability for Life Scientists - Frederick R. Adler 2012-01-01

Designed to help life sciences students understand the role mathematics has played in breakthroughs in epidemiology, genetics, statistics, physiology, and other biological areas, MODELING THE DYNAMCICS OF LIFE: CALCULUS AND PROBABILTY FOR LIFE SCIENTISTS, Third Edition, provides students with a thorough grounding in mathematics, the language, and 'the technology of thought' with which these developments are created and controlled. The text teaches the skills of describing a system, translating appropriate aspects into equations, and interpreting the results in terms of the original problem. The text helps unify biology by identifying dynamical principles that underlie a great diversity of biological processes. Standard topics from calculus courses are covered, with particular emphasis on those areas connected with modeling such as discrete-time dynamical systems, differential equations, and probability and statistics. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Self-Organized Biological Dynamics and Nonlinear Control - Jan Walleczek 2006-04-20

The growing impact of nonlinear science on biology and medicine is fundamentally changing our view of living organisms and disease processes. This book introduces the application to biomedicine of a broad range of interdisciplinary concepts from nonlinear dynamics, such as self-organization, complexity, coherence, stochastic resonance, fractals and chaos. It comprises 18 chapters written by leading figures in the field and covers experimental and theoretical research, as well as the emerging technological possibilities such as nonlinear control techniques for treating pathological biodynamics, including heart arrhythmias and epilepsy. This book will attract the interest of professionals and students from a wide range of disciplines, including physicists, chemists, biologists, sensory physiologists and medical researchers such as cardiologists, neurologists and biomedical engineers.

Models of Life - Kim Sneppen 2014-10-02

An overview of current models of biological systems, reflecting the major advances that have been made over the past decade.

Spatial Dynamics and Pattern Formation in Biological Populations - Ranjit Kumar Upadhyay 2021-02-23

The book provides an introduction to deterministic (and some stochastic) modeling of spatiotemporal phenomena in ecology, epidemiology, and neural systems. A survey of the classical models in the fields with up to date applications is given. The book begins with detailed description of how spatial dynamics/diffusive processes influence the dynamics of biological populations. These processes play a key role in understanding the outbreak and spread of pandemics which help us in designing the control strategies from the public health perspective. A brief discussion on the functional mechanism of the brain (single neuron models and network level) with classical models of neuronal dynamics in space and time is given. Relevant phenomena and existing modeling approaches in ecology, epidemiology and neuroscience are introduced, which provide examples of pattern formation in these models. The analysis of patterns

enables us to study the dynamics of macroscopic and microscopic behaviour of underlying systems and travelling wave type patterns observed in dispersive systems. Moving on to virus dynamics, authors present a detailed analysis of different types models of infectious diseases including two models for influenza, five models for Ebola virus and seven models for Zika virus with diffusion and time delay. A Chapter is devoted for the study of Brain Dynamics (Neural systems in space and time). Significant advances made in modeling the reaction-diffusion systems are presented and spatiotemporal patterning in the systems is reviewed. Development of appropriate mathematical models and detailed analysis (such as linear stability, weakly nonlinear analysis, bifurcation analysis, control theory, numerical simulation) are presented. Key Features Covers the fundamental concepts and mathematical skills required to analyse reaction-diffusion models for biological populations. Concepts are introduced in such a way that readers with a basic knowledge of differential equations and numerical methods can understand the analysis. The results are also illustrated with figures. Focuses on mathematical modeling and numerical simulations using basic conceptual and classic models of population dynamics, Virus and Brain dynamics. Covers wide range of models using spatial and non-spatial approaches. Covers single, two and multispecies reaction-diffusion models from ecology and models from bio-chemistry. Models are analysed for stability of equilibrium points, Turing instability, Hopf bifurcation and pattern formations. Uses Mathematica for problem solving and MATLAB for pattern formations. Contains solved Examples and Problems in Exercises. The Book is suitable for advanced undergraduate, graduate and research students. For those who are working in the above areas, it provides information from most of the recent works. The text presents all the fundamental concepts and mathematical skills needed to build models and perform analyses.

Glencoe Biology Laboratory Manual - McGraw-Hill/Glencoe 1999-07-01

Biology: the Dynamics of Life - Alton Biggs 1999-04-01

General biology text with National Geographic features in each unit and test-taking tips written by the Princeton Review.

Glencoe Biology: The Dynamics of Life, Dinah Zikes Teaching Math & Science with Foldables - McGraw-Hill Education 2004-10-15

Foldables - student-made, three-dimensional graphic organizers - are a unique strategy to help students read effectively. They also can be used as assessment or study tools. Students of any ability can create Foldables and as they work with these manipulatives, they are fully involved in learning, studying, and reviewing important concepts.

Glencoe Science Biology - Alton Biggs 2006

General biology text with National Geographic features for each unit, test-taking tips written by the Princeton Review, the Guide to FCAT success, and a teacher handbook.