Evolutionary Dynamics Exploring The Equations Of Life

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Evolutionary Dynamics Exploring The Equations

Evolutionary Dynamics provides a new generation with an opportunity to draw from the masters.-- (12/22/2006) Two of the crucial processes that drive evolution, mutation and selection, can be described with mathematical equations. This book introduces the reader to the basic mathematical laws that govern the evolution of life...

Evolutionary Dynamics: Exploring the Equations of Life ...

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Evolutionary Dynamics ? Exploring The Equations Of Life ...

The resulting evolutionary dynamics are no longer described by deterministic differential equations, but require a stochastic formulation. The best approach for studying a biological problem is to try a deterministic description first and then move to a stochastic analysis only when the deterministic one misses relevant aspects.

Evolutionary Dynamics: Exploring the Equations of Life on ...

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...

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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 Nowak draws on the languages of biology and mathematics to outline the mathematical principles according to which life evolves.

Evolutionary Dynamics: Exploring the Equations of Life ...

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Evolutionary Dynamics — Martin A. Nowak | Harvard ...

evolutionary dynamics exploring the equations of life Sep 13, 2020 Posted By Georges Simenon Media TEXT ID c5301f19 Online PDF Ebook Epub Library 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

Evolutionary Dynamics Exploring The Equations Of Life PDF

Evolutionary Dynamics: Exploring the Equations of Life: Nowak, Martin A: Amazon.com.tr Çerez Tercihlerinizi Seçin Alışveriş deneyiminizi geliştirmek, hizmetlerimizi sunmak, müşterilerin hizmetlerimizi nasıl kullandığını anlayarak iyileştirmeler yapabilmek ve tanıtımları gösterebilmek için çerezler ve benzeri araçları kullanmaktayız.

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Amazon.com Evolutionary Dynamics: Exploring the Equations ...

Evolutionary dynamics : exploring the equations of life / Martin A. Nowak. p. cm. Includes bibliographical references and index. ISBN-13: 978-0-674-02338-3 (alk. paper) ISBN-10: 0-674-02338-2 (alk. paper) 1. Evolution (Biology)—Mathematical models. I. Title. QH371.3.M37N69 2006 576.801 5118—dc22 2006042693 Designed by Gwen Nefsky Frankfeldt

EVOLUTIONARY DYNAMICS - Harvard University

Evolutionary Dynamics leads the reader through the past two decades work on uncovering the mathematical framework for evolutionary processes. It provides a compelling (I will use this word too often in this review) introduction to evolution and how to formalize it.

Amazon.com Customer reviews: Evolutionary Dynamics ...

An interesting introduction to evolution and the equations that govern it. The book gets started with an introduction to the concept of evolution and how replication, mutation, and selection, affect it. Every simple mechanism that is in action in nature, is modeled using differential equations.

Evolutionary Dynamics: Exploring the Equations of Life by ...

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

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Nowak, M: Evolutionary Dynamics: Exploring the Equations ...

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Evolutionary Dynamics Exploring The Equations Of Life

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Draws on the languages of biology and mathematics to outline the mathematical principles according to which life evolves in an intriguing study that makes a clear and compelling case for understanding every living system in terms of evolutionary dynamics.

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.

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Evolution, Games, and God explores how cooperation and altruism, alongside mutation and natural selection, play a critical role in evolution, from microbes to human societies. Inheriting a tendency to cooperate and self-sacrifice on behalf of others may be as beneficial to a population's survival as the self-preserving instincts of individuals.

Examines the importance of cooperation in human beings and in nature, arguing that this social tool is as an important aspect of evolution as mutation and natural selection.

This groundbreaking book describes the emerging field of theoretical immunology, in particular the use of mathematical models to describe the spread of infectious diseases within patients. It reveals fascinating insights into the dynamics of viral and other infections, and the interactions between infectious agents and immune responses. Structured around the examples of HIV/AIDS and hepatitis B, Nowak and May show how mathematical models can help researchers to understand the detailed dynamics of infection and the effects of antiviral therapy. Models are developed to describe the dynamics of drug resistance, immune responses, viral evolution and mutation, and to optimise the design of therapy and vaccines. - ;We know, down to the tiniest details, the molecular structure of the human immunodeficiency virus (HIV). Yet despite this tremendous accomplishment, and despite other remarkable advances in our understanding of individual viruses and cells of the immune system, we still have no agreed understanding of the ultimate course and variability of the pathogenesis of AIDS. Gaps in our understanding like these impede our efforts towards developing effective therapies and preventive vaccines. Martin Nowak and Robert M May describe the emerging field of theoretical immunology in this accessible and well- written text. Using mathematical modelling techniques, the authors set out their ideas about how populations of viruses and populations of immune system cells may interact in various circumstances, and how infectious diseases spread within patients. They explain how this approach to understanding infectious diseases can reveal insights into the dynamics of viral and other infections, and the interactions between infectious agents and immune responses. The book is structured around the examples of HIV/AIDS and Hepatitis B virus, although the approaches described will be more widely applicable. The authors use mathematical tools to uncover the detailed dynamics of the infection and the effects of antiviral therapy. Models are developed to describe the emergence of drug resistance, and the dynamics of immune responses, viral evolution, and mutation. The practical implications of this work for optimisation of the design of therapy and vaccines are discussed. The book concludes with a glance towards the future of this fascinating, and potentially highly useful, field of study. - ;... an excellent introduction to a field that has the potential to advance substantially our understanding of the complex interplay between virus and host - Nature

This 1982 book is an account of an alternative way of thinking about evolution and the theory of games.

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

Introduces current evolutionary game theory--where ideas from evolutionary biology and rationalistic economics meet--emphasizing the links between static and dynamic approaches and noncooperative game theory. This text introduces current evolutionary game theory--where ideas from evolutionary biology and rationalistic economics meet--emphasizing the links between static and dynamic approaches and noncooperative game theory. Much of the text is devoted to the key concepts of evolutionary stability and replicator dynamics. The former highlights the role of mutations and the latter the mechanisms of selection. Moreover, set-valued static and dynamic stability concepts, as well as processes of social evolution, are discussed. Separate background chapters are devoted to noncooperative game theory and the theory of ordinary differential equations. There are examples throughout as well as individual chapter summaries. Because evolutionary game theory is a fast-moving field that is itself branching out and rapidly evolving, Jörgen Weibull has judiciously focused on clarifying and explaining core elements of the theory in an up-to-date, comprehensive, and self-contained treatment. The result is a text for second-year graduate students in economic theory, other social sciences, and evolutionary biology. The book goes beyond filling the gap between texts by Maynard-Smith and Hofbauer and Sigmund that are currently being used in the field. Evolutionary Game Theory will also serve as an introduction for those embarking on research in this area as well as a reference for those already familiar with the field. Weibull provides an overview of the developments that have taken place in this branch of game theory, discusses the mathematical tools needed to understand the area, describes both the motivation and intuition for the concepts involved, and explains why and how it is relevant to economics.

Thorough and accessible, this book presents the design principles of biological systems, and highlights the recurring circuit elements that make up biological networks. It provides a simple mathematical framework which can be used to understand and even design biological circuits. The textavoids specialist terms, focusing instead on several well-studied biological systems that concisely demonstrate key principles. An Introduction to Systems Biology: Design Principles of Biological Circuits builds a solid foundation for the intuitive understanding of general principles. It encourages the reader to ask why a system is designed in a particular way and then proceeds to answer with simplified models.