

**Biomathematics
Volume 9**

W. J. Ewens

**Mathematical
Population
Genetics**



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Mathematical Population Genetics

Aleksnader Klimek



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Mathematical Population Genetics 1 Warren J. Ewens, 2012-10-01 Population genetics occupies a central role in a number of important biological and social undertakings. It is fundamental to our understanding of evolutionary processes of plant and animal breeding programs and of various diseases of particular importance to mankind. This is the first of a planned two volume work discussing the mathematical aspects of population genetics with an emphasis on the evolutionary theory. This first volume draws heavily from the author's classic 1979 edition which appeared originally in Springer's Biomathematics series. It has been revised and expanded to include recent topics which follow naturally from the treatment in the earlier edition, e.g. the theory of molecular population genetics. This book will appeal to graduate students and researchers in mathematical biology and other mathematically trained scientists looking to enter the field of population genetics.

Mathematical Population Genetics Warren J. Ewens, 1979 *Mathematical Population Genetics 1* Warren J. Ewens, 2012-11-06 This is the first of a planned two volume work discussing the mathematical aspects of population genetics with an emphasis on evolutionary theory. This volume draws heavily from the author's 1979 classic but it has been revised and expanded to include recent topics which follow naturally from the treatment in the earlier edition such as the theory of molecular population genetics. *Mathematical Population Genetics 1* Warren J. Ewens, 2004-01-09 This is the first of a planned two volume work discussing the mathematical aspects of population genetics with an emphasis on evolutionary theory. This volume draws heavily from the author's 1979 classic but it has been revised and expanded to include recent topics which follow naturally from the treatment in the earlier edition such as the theory of molecular population genetics.

Mathematical Population Genetics: Lecture Notes Warren J. Ewens, 2014-11-08 **Mathematical Population Genetics** Lecture Notes By Warren J. Ewens **Mathematical Population Genetics And Evolution Of Bacterial Cooperation**

Volker Hosel, Christina Kuttler, Johannes Muller, 2020-03-13 Social life of bacteria is in the focus of recent research. Bacteria are simple enough to be accessible by science but still complex enough to show cooperation, division of labor, bet hedging, cross talk and synchronized activities and a rich variety of social traits. A central question of evolutionary theory is the explanation why this social life did develop and why these systems are evolutionarily stable. This book introduces the reader into the theory of evolution covering classical models and as well as recent developments. The theory developed is used to represent the up to date understanding of social bacteria. This book will be useful for students and lecturers interested in mathematical evolutionary theory as well as for researchers as a reference. Foundations of Mathematical Genetics

Anthony William Fairbank Edwards, 2000-01-13 In this 2000 second edition of the classic work *Foundations of Mathematical Genetics* a definitive account is given of the basic models of population genetics together with the historical origins of developments since 1908. Existing texts in mathematical population genetics have revealed the need for a careful study of the foundations of the field which have tended to be neglected in the past. This book satisfies that need treating the simple

deterministic models for random mating diploid populations in depth though without sacrificing clarity of expression In the new edition coverage has been extended with the provision of an extra chapter on the Fundamental Theorem of Natural Selection This book is written for those interested in the mathematical aspects of genetics ecology and biology Both students of mathematical genetics and historians of the subject will find it a definitive statement of the origins of modern mathematical population genetics

Mathematical Population Genetics Mathematisches Forschungsinstitut Oberwolfach, 2005

Population Genetics W.J. Ewens, 2013-03-12 Population genetics is the mathematical investigation of the changes in the genetic structure of populations brought about by selection mutation inbreeding migration and other phenomena together with those random changes deriving from chance events These changes are the basic components of evolutionary progress and an understanding of their effect is therefore necessary for an informed discussion of the reasons for and nature of evolution It would however be wrong to pretend that a mathematical theory depending as it must on a large number of simplifying assumptions should be accepted unreservedly and that its conclusions should be accepted uncritically No one would pretend that in the event of disagreement between observation and mathematical prediction the discrepancy is due to anything other than the inadequacy of the mathematical treatment The biological world is of course far too complex for the study of population genetics to be simply a branch of applied mathematics so that while we are concerned here with the mathematical theory I have tried to indicate which of our results should continue to apply in a context wider than that in which they are formally derived The difficulties involved in the joint discussions of mathematical and genetical problems are obvious enough I have tried to aim this book rather more at the mathematician than at the geneticist and for this reason a brief glossary of common genetical terms is included

Some Mathematical Models from Population Genetics Alison Etheridge, 2011-01-05 This work reflects sixteen hours of lectures delivered by the author at the 2009 St Flour summer school in probability It provides a rapid introduction to a range of mathematical models that have their origins in theoretical population genetics The models fall into two classes forwards in time models for the evolution of frequencies of different genetic types in a population and backwards in time coalescent models that trace out the genealogical relationships between individuals in a sample from the population Some like the classical Wright Fisher model date right back to the origins of the subject Others like the multiple merger coalescents or the spatial Lambda Fleming Viot process are much more recent All share a rich mathematical structure Biological terms are explained the models are carefully motivated and tools for their study are presented systematically

Mathematical Topics in Population Genetics Ken-ichi Kojima, 2012-12-06 A basic method of analyzing particulate gene systems is the probabilistic and statistical analyses Mendel himself could not escape from an application of elementary probability analysis although he might have been unaware of this fact Even Galtonian geneticists in the late 1800 s and the early 1900 s pursued problems of heredity by means of mathematics and mathematical statistics They failed to find the principles of heredity but succeeded to establish an interdisciplinary area between

mathematics and biology which we call now Biometrics Biometry or Applied Statistics A monumental work in the field of population genetics was published by the late R A Fisher who analyzed the correlation among relatives based on Mendelian gene theory 1918 This theoretical analysis over came so called blending inheritance theory and the orientation of Galtonian explanations for correlations among relatives for quantitative traits rapidly changed We must not forget the experimental works of Johanson 1909 and Nilsson Ehle 1909 which supported Mendelian gene theory However a large scale experiment for a test of segregation and linkage of Mendelian genes affecting quantitative traits was probably for the first time conducted by K Mather and his associates and Panse in the 1940 s

Mathematical Theories of Populations Frank Hoppensteadt, 1975-12-01 A basic model in population age structure is studied and then applied and extended to several population phenomena

Mathematics of Genetic Diversity J. F. C. Kingman, 1980-01-01 This book draws together some mathematical ideas that are useful in population genetics concentrating on a few aspects which are both biologically relevant and mathematically interesting

Some Models from Mathematical Population Genetics with Fluctuations in the Environment Aleksnader Klimek, 2018

Some Mathematical Models from Population Genetics Alison Etheridge, 2011-03-30 Based on the author's lectures at the 2009 St Flour summer school in probability this volume provides an introduction to a range of mathematical models that have their origins in theoretical population genetics

Probability and Mathematical Genetics N. H. Bingham, C. M. Goldie, 2010-07-15 Focussing on the work of Sir John Kingman one of the world's leading researchers in probability and mathematical genetics this book touches on the important areas of these subjects in the last 50 years Leading authorities give a unique insight into a wide range of currently topical problems Papers in probability concentrate on combinatorial and structural aspects in particular exchangeability and regeneration The Kingman coalescent links probability with mathematical genetics and is fundamental to the study of the latter This has implications across the whole of genomic modelling including the Human Genome Project Other papers in mathematical population genetics range from statistical aspects including heterogeneous clustering to the assessment of molecular variability in cancer genomes Further papers in statistics are concerned with empirical deconvolution perfect simulation and wavelets This book will be warmly received by established experts as well as their students and others interested in the content

Mathematical Properties of Population-Genetic Statistics Noah A. Rosenberg, 2025-05-20 A pedagogical monograph showing how to use the mathematical properties of population genetic statistics to better interpret genetic data

Mathematical Methods for Population Genetics G. Dahlberg, 1946-11-30

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