An Introduction To Population Genetics Theory And Applications

Population Genetics and Microevolutionary TheoryAn Introduction to Population Genetics TheoryMy Thoughts on Biological EvolutionElements of Evolutionary GeneticsA Primer of Population Genetics and GenomicsLandscape GeneticsThe Origins of Theoretical Population GeneticsIntroduction to Population GeneticsPopulation GeneticsMolecular Evolution and Population Genetics for Marine BiologistsIntroduction to Theoretical Population GeneticsTheory of Population Genetics and Evolutionary EcologyBasic Concepts in Population, Quantitative, and Evolutionary GeneticsIntroduction to Forest GeneticsConservation and the Genetics of PopulationsAn Introduction to Genetic EpidemiologyHuman Population Genetics and GenomicsHuman Population GeneticsMolecular Population GeneticsForward-Time Population Genetics SimulationsPopulation Genomics with RPopulation GeneticsIntroducing GeneticsIntroduction to Conservation GeneticsGenetics, Demography and Viability of Fragmented PopulationsAn Introduction to Genetic AlgorithmsMathematical Population Genetics 1A Primer of Molecular Population GeneticsPopulation BiologyIntroduction to Population BiologyPopulation GenomicsAn Introduction to Population GeneticsEvolution and the Genetics of Populations, Volume 2Genetics of PopulationsStatistical Population GenomicsStatistical Methods in Molecular EvolutionCoalescent TheoryTheories of Population Variation in Genes and GenomesPrinciples of Population GeneticsUnderstanding Population Genetics

Population Genetics and Microevolutionary Theory

Interpretations, extensions and comments -- Altruism and natural selection via individuals and groups -- Frequency-dependent selection and resource competition -- Rare allele advantage due to infections and self-incompatibility -- Questions -- Chapter 9 Selection on a quantitative trait -- Analysis -- Selection in quantitative genetics -- Selection in population genetics - one more time -- Notations and assumptions -- Combining the tools -- Summing up -- Interpretations, extensions and comments -- The genetic effect of selection on a quantitative trait -- The limits of selection and the nature of -- Threshold selection and disease liability -- Quantitative genetics is not suited for causal analyses -- Chapter 10 Evolutionary genetic analysis of the sex ratio -- Analysis -- Assumptions and notations -- Finding the recursion equation system -- Testing for stability -- Summing up -- Interpretations, extensions and comments -- Sex ratio selection -- An explanation of well-delimited validity -- Meiotic recombination is an evolved genetic system -- Evolutionary genetic analysis -- What's next? -- Estimates and tests in population genetics -- The mutation-selection balance -- Partial genetic isolation -- Segregation distortion and genetic conflicts -- Epilogue -- Thanks -- Glossary -- Answers -- References -- Index -- EULA

An Introduction to Population Genetics Theory

This textbook shows readers how models of the genetic processes involved in evolution are made (including natural selection, migration, mutation, and genetic drift in finite populations), and how the models are used to interpret classical and molecular genetic data. The material

is intended for advanced level undergraduate courses in genetics and evolutionary biology, graduate students in evolutionary biology and human genetics, and researchers in related fields who wish to learn evolutionary genetics. The topics covered include genetic variation, DNA sequence variability and its measurement, the different types of natural selection and their effects (e.g. the maintenance of variation, directional selection, and adaptation), the interactions between selection and mutation or migration, the description and analysis of variation at multiple sites in the genome, genetic drift, and the effects of spatial structure.

My Thoughts on Biological Evolution

Principles of Population Genetics, Third Edition gives a balanced presentation of theory and observation for students at the undergraduate and graduate levels. Applications of the principles discussed are illustrated by numerous worked examples.

Elements of Evolutionary Genetics

"Wright's views about population genetics and evolution are so fundamental and so comprehensive that every serious student must examine these books firsthand. . . . Publication of this treatise is a major event in evolutionary biology."-Daniel L. Hartl, BioScience

A Primer of Population Genetics and Genomics

This open access volume presents state-of-the-art inference methods in population genomics, focusing on data analysis based on rigorous statistical techniques. After introducing general concepts related to the biology of genomes and their evolution, the book covers state-of-the-art methods for the analysis of genomes in populations, including demography inference, population structure analysis and detection of selection, using both model-based inference and simulation procedures. Last but not least, it offers an overview of the current knowledge acquired by applying such methods to a large variety of eukaryotic organisms. Written in the highly successful Methods in Molecular Biology series format, chapters include introductions to their respective topics, pointers to the relevant literature, step-by-step, readily reproducible laboratory protocols, and tips on troubleshooting and avoiding known pitfalls. Authoritative and cutting-edge, Statistical Population Genomics aims to promote and ensure successful applications of population genomic methods to an increasing number of model systems and biological questions. This work was published by Saint Philip Street Press pursuant to a Creative Commons license permitting commercial use. All rights not granted by the work's license are retained by the author or authors.

Landscape Genetics

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.

The Origins of Theoretical Population Genetics

This book, written by Motoo Kimura (1924–94), is a classic in evolutionary biology. In 1968, Kimura proposed the “neutral theory of molecular evolution”, which became the theoretical basis of modern evolutionary studies. After publishing his work in 1983 in the book “Neutral Theory of Molecular Evolution”, Kimura wrote this book in 1988 for the general public. It was originally written in Japanese and is translated here for the first time. In the book, Kimura first summarizes the development of evolutionary theory since Lamarck and Darwin. He then shows how the search for mechanisms of evolution developed into population genetics and describes how the study of molecular evolution matured by taking in the fruits of molecular biology. Kimura proceeds to carefully explain his neutral evolution theory at the molecular level. Finally, he presents his view of the world from an evolutionary perspective. The book has long served as an in-depth introduction to evolutionary biology for students and young researchers in Japan. There has been remarkably rapid progress in the field of bioscience at the molecular level over the past 30 years. Nevertheless, the book remains an important contribution that laid the foundations for what followed in molecular evolutionary studies.

Introduction to Population Genetics

The only book available in the area of forward-time populationgenetics simulations—applicable to both biomedical andevolutionary studies The rapid increase of the power of personal computers has led tothe use of serious forward-time simulation programs in geneticstudies. Forward-Time Population Genetics Simulationspresents both new and commonly used methods, and introducessimuPOP, a powerful and flexible new program that can be used tosimulate arbitrary evolutionary processes with unique features likecustomized chromosome types, arbitrary nonrandom mating schemes,virtual subpopulations, information fields, and Pythonoperators. The book begins with an overview of important concepts andmodels, then goes on to show how simuPOP can simulate a number ofstandard population genetics models—with the goal ofdemonstrating the impact of genetic factors such as mutation,selection, and recombination on standard Wright-Fisher models. Therest of the book is devoted to applications of forward-timesimulations in various research topics. Forward-Time Population Genetics Simulationsincludes: An overview of currently available forward-time simulationmethods, their advantages, and shortcomings An overview and evaluation of currently available software A simuPOP tutorial Applications in population genetics Applications in genetic epidemiology, statistical genetics, andmapping complex human diseases The only book of its kind in the field today, Forward-TimePopulation Genetics Simulations will appeal to researchers andstudents of population and statistical genetics.

Population Genetics

Genetic algorithms : an overview - Genetic algorithms in problem solving - Genetic algorithms in scientific models - Theoretical foundations of

genetic algorithms - Implementing a genetic algorithm.

Molecular Evolution and Population Genetics for Marine Biologists

A detailed introduction to the genetic and demographic issues relevant to the conservation of fragmented populations.

Introduction to Theoretical Population Genetics

This book covers those areas of theoretical population genetics that can be investigated rigorously by elementary mathematical methods. I have tried to formulate the various models fairly generally and to state the biological as sumptions quite explicitly. I hope the choice and treatment of topics will en able the reader to understand and evaluate detailed analyses of many specific models and applications in the literature. Models in population genetics are highly idealized, often even over idealized, and their connection with observation is frequently remote. Further more, it is not practicable to measure the parameters and variables in these models with high accuracy. These regrettable circumstances amply justify the use of appropriate, lucid, and rigorous approximations in the analysis of our models, and such approximations are often illuminating even when exact solu tions are available. However, our empirical and theoretical limitations justify neither opaque, incomplete formulations nor unconvincing, inadequate analy ses, for these may produce uninterpretable, misleading, or erroneous results. Intuition is a principal source of ideas for the construction and investigation of models, but it can replace neither clear formulation nor careful analysis. Fisher (1930; 1958, pp. x, 23-24, 38) not only espoused similar ideas, but he recognized also that our concepts of intuition and rigor must evolve in time. The book is neither a review of the literature nor a compendium of results. The material is almost entirely self-contained. The first eight chapters are a thoroughly revised and greatly extended version of my published lecture notes (Nagylaki, 1977a).

Theory of Population Genetics and Evolutionary Ecology

In the field of molecular evolution, inferences about past evolutionary events are made using molecular data from currently living species. With the availability of genomic data from multiple related species, molecular evolution has become one of the most active and fastest growing fields of study in genomics and bioinformatics. Most studies in molecular evolution rely heavily on statistical procedures based on stochastic process modelling and advanced computational methods including high-dimensional numerical optimization and Markov Chain Monte Carlo. This book provides an overview of the statistical theory and methods used in studies of molecular evolution. It includes an introductory section suitable for readers that are new to the field, a section discussing practical methods for data analysis, and more specialized sections discussing specific models and addressing statistical issues relating to estimation and model choice. The chapters are written by the leaders of field and they will take the reader from basic introductory material to the state-of-the-art statistical methods. This book is suitable for statisticians seeking to learn more about applications in molecular evolution and molecular evolutionary biologists with an interest in learning more about the theory behind the statistical methods applied in the field. The chapters of the book assume no advanced

mathematical skills beyond basic calculus, although familiarity with basic probability theory will help the reader. Most relevant statistical concepts are introduced in the book in the context of their application in molecular evolution, and the book should be accessible for most biology graduate students with an interest in quantitative methods and theory. Rasmus Nielsen received his Ph.D. form the University of California at Berkeley in 1998 and after a postdoc at Harvard University, he assumed a faculty position in Statistical Genomics at Cornell University. He is currently an Ole Rømer Fellow at the University of Copenhagen and holds a Sloan Research Fellowship. His is an associate editor of the Journal of Molecular Evolution and has published more than fifty original papers in peer-reviewed journals on the topic of this book. From the reviews: "Overall this is a very useful book in an area of increasing importance." Journal of the Royal Statistical Society "I find Statistical Methods in Molecular Evolution very interesting and useful. It delves into problems that were considered very difficult just several years agothe book is likely to stimulate the interest of statisticians that are unaware of this exciting field of applications. It is my hope that it will also help the 'wet lab' molecular evolutionist to better understand mathematical and statistical methods." Marek Kimmel for the Journal of the American Statistical Association, September 2006 "Who should read this book? We suggest that anyone who deals with molecular data (who does not?) and anyone who asks evolutionary questions (who should not?) ought to consult the relevant chapters in this book." Dan Graur and Dror Berel for Biometrics, September 2006 "Coalescence theory facilitates the merger of population genetics theory with phylogenetic approaches, but still, there are mostly two camps: phylogeneticists and population geneticists. Only a few people are moving freely between them. Rasmus Nielsen is certainly one of these researchers, and his work so far has merged many population genetic and phylogenetic aspects of biological research under the umbrella of molecular evolution. Although Nielsen did not contribute a chapter to his book, his work permeates all its chapters. This book gives an overview of his interests and current achievements in molecular evolution. In short, this book should be on your bookshelf." Peter Beerli for Evolution, 60(2), 2006

Basic Concepts in Population, Quantitative, and Evolutionary Genetics

Introductory guide to human population genetics and microevolutionary theory Providing an introduction to mathematical population genetics, Human Population Genetics gives basic background on the mechanisms of human microevolution. This text combines mathematics, biology, and anthropology and is best suited for advanced undergraduate and graduate study. Thorough and accessible, Human Population Genetics presents concepts and methods of population genetics specific to human population study, utilizing uncomplicated mathematics like high school algebra and basic concepts of probability to explain theories central to the field. By describing changes in the frequency of genetic variants from one generation to the next, this book hones in on the mathematical basis of evolutionary theory. Human Population Genetics includes: Helpful formulae for learning ease Graphs and analogies that make basic points and relate the evolutionary process to mathematical ideas Glossary terms marked in boldface within the book the first time they appear In-text citations that act as reference points for further research Exemplary case studies Topics such as Hardy-Weinberg equilibrium, inbreeding, mutation, genetic drift, natural selection, and gene flow Human Population Genetics solidifies knowledge learned in introductory biological anthropology or biology courses and makes it applicable to genetic study. NOTE: errata for the first edition can be found at the author's website: http://employees.oneonta.edu/relethjh/HPG/errata.pdf

Introduction to Forest Genetics

"An introduction to coalescent theory, which provides the foundation for molecular population genetics and genomics. Coalescent theory is the conceptual framework for studies of DNA sequence variation within species, and is the source of essential tools for making inferences about mutation, recombination, population structure and natural selection from DNA sequence data"--Provided by publisher.

Conservation and the Genetics of Populations

This textbook provides an authoritative introduction to both classical and coalescent approaches to population genetics. Written for graduate students and advanced undergraduates by one of the world's leading authorities in the field, the book focuses on the theoretical background of population genetics, while emphasizing the close interplay between theory and empiricism. Traditional topics such as genetic and phenotypic variation, mutation, migration, and linkage are covered and advanced by contemporary coalescent theory, which describes the genealogy of genes in a population, ultimately connecting them to a single common ancestor. Effects of selection, particularly genomic effects, are discussed with reference to molecular genetic variation. The book is designed for students of population genetics, bioinformatics, evolutionary biology, molecular evolution, and theoretical biology--as well as biologists, molecular biologists, breeders, biomathematicians, and biostatisticians. Contains up-to-date treatment of key areas in classical and modern theoretical population genetics Provides in-depth coverage of coalescent theory Discusses genomic effects of selection Gives examples from empirical population genetics Incorporates figures, diagrams, and boxed features throughout Includes end-of-chapter exercises Speaks to a wide range of students in biology, bioinformatics, and biostatistics

An Introduction to Genetic Epidemiology

Population Genomics With R presents a multidisciplinary approach to the analysis of population genomics. The methods treated cover a large number of topics from traditional population genetics to large-scale genomics with high-throughput sequencing data. Several dozen R packages are examined and integrated to provide a coherent software environment with a wide range of computational, statistical, and graphical tools. Small examples are used to illustrate the basics and published data are used as case studies. Readers are expected to have a basic knowledge of biology, genetics, and statistical inference methods. Graduate students and post-doctorate researchers will find resources to analyze their population genetic and genomic data as well as help them design new studies. The first four chapters review the basics of population genomics, data acquisition, and the use of R to store and manipulate genomic data. Chapter 5 treats the exploration of genomic data, an important issue when analysing large data sets. The other five chapters cover linkage disequilibrium, population genomic structure, geographical structure, past demographic events, and natural selection. These chapters include supervised and unsupervised methods, admixture analysis, an in-depth treatment of multivariate methods, and advice on how to handle GIS data. The analysis of natural selection, a traditional issue in evolutionary biology, has known a revival with modern population genomic data. All chapters include

exercises. Supplemental materials are available on-line (http://ape-package.ird.fr/PGR.html).

Human Population Genetics and Genomics

Making the theory of population genetics relevant to readers, this book explains the related mathematics with a logical organization. It presents the quantitative aspects of population genetics, and employs examples of human genetics, medical evolution, human evolution, and endangered species. For an introduction to, and understanding of, population genetics.

Human Population Genetics

This accessible primer has been completely revised and updated to provide a concise but comprehensive introduction to the basic concepts of population genetics and genomics.

Molecular Population Genetics

This impressive author team brings the wealth of advances in conservation genetics into the new edition of this introductory text, including new chapters on population genomics and genetic issues in introduced and invasive species. They continue the strong learning features for students - main points in the margin, chapter summaries, vital support with the mathematics, and further reading - and now guide the reader to software and databases. Many new references reflect the expansion of this field. With examples from mammals, birds,

Forward-Time Population Genetics Simulations

What are the genomic signatures of adaptations in DNA? How often does natural selection dictate changes to DNA? How does the ebb and flow in the abundance of individuals over time get marked onto chromosomes to record genetic history? Molecular population genetics seeks to answer such questions by explaining genetic variation and molecular evolution from micro-evolutionary principles. It provides a way to learn about how evolution works and how it shapes species by incorporating molecular details of DNA as the heritable material. It enables us to understand the logic of how mutations originate, change in abundance in populations, and become fixed as DNA sequence divergence between species. With the revolutionary advances in genomic data acquisition, understanding molecular population genetics is now a fundamental requirement for today's life scientists. These concepts apply in analysis of personal genomics, genome-wide association studies, landscape and conservation genetics, forensics, molecular anthropology, and selection scans. This book introduces, in an accessible way, the bare essentials of the theory and practice of molecular population genetics.

Population Genomics with R

Published by Sinauer Associates, an imprint of Oxford University Press. Provides descriptions of the methods and tools used in molecular population genetics, which has combined advances in molecular biology and genomics with mathematical and empirical findings to uncover the history of natural selection and demographic shifts in many organisms.

Population Genetics

Genetic epidemiology is a field that has acquired a central role in modern biomedical science. This book provides an introduction to genetic epidemiology that begins with a primer in human molecular genetics and then examines the standard methods in population genetics and genetic epidemiology

Introducing Genetics

This concise introduction addresses the theories behind population genetics and relevant empirical evidence, genetic drift, natural selection, nonrandom mating, quantitative genetics, and the evolutionary advantage of sex.

Introduction to Conservation Genetics

Originally published in 1970, this classic in the field of population genetics opens with elementary concepts and deals primarily with natural populations and less fully with the rather similar problems that arise in breeding livestock and cultivated plants.

Genetics, Demography and Viability of Fragmented Populations

Human Population Genetics and Genomics provides researchers/students with knowledge on population genetics and relevant statistical approaches to help them become more effective users of modern genetic, genomic and statistical tools. In-depth chapters offer thorough discussions of systems of mating, genetic drift, gene flow and subdivided populations, human population history, genotype and phenotype, detecting selection, units and targets of natural selection, adaptation to temporally and spatially variable environments, selection in age-structured populations, and genomics and society. As human genetics and genomics research often employs tools and approaches derived from population genetics, this book helps users understand the basic principles of these tools. In addition, studies often employ statistical approaches and analysis, so an understanding of basic statistical theory is also needed. Comprehensively explains the use of population genetics and genomics in medical applications and research Discusses the relevance of population genetics and genomics to major social issues, including race and the dangers of modern eugenics proposals Provides an overview of how population genetics and genomics helps us understand where we came from as a species and how we evolved into who we are now

An Introduction to Genetic Algorithms

The new edition of Introducing Genetics is a clear, concise, and accessible guide to inheritance and variation in individuals and populations. It first establishes the principles of Mendelian inheritance and the nature of chromosomes, before tackling quantitative and population genetics. The final three chapters introduce the molecular mechanisms t

Mathematical Population Genetics 1

Updated to include two new chapters, a modified Part II structure, more recent empirical examples, and online spreadsheet simulations.

A Primer of Molecular Population Genetics

This is a reprint of a classic which synthesizes population, genetics, and population genetics to form one of the first books on evolutionary ecology. Written by one of the foremost authorities in the field, it is designed as an introduction useful to readers at various levels from diverse backgrounds. It features balanced, readable coverge of both elementary and advanced topics that are essential to those interested in evolutionary biology, ecology, animal behavior, sociobiology, and paleobiology.

Population Biology

This book aims to make population genetics approachable, logical and easily understood. To achieve these goals, the book’s design emphasizes well explained introductions to key principles and predictions. These are augmented with case studies as well as illustrations along with introductions to classical hypotheses and debates. Pedagogical features in the text include: Interact boxes that guide readers step-by-step through computer simulations using public domain software. Math boxes that fully explain mathematical derivations. Methods boxes that give insight into the use of actual genetic data. Numerous Problem boxes are integrated into the text to reinforce concepts as they are encountered. Dedicated website at www.wiley.com/go/hamiltongenetics This text also offers a highly accessible introduction to coalescent theory, the major conceptual advance in population genetics of the last two decades.

Introduction to Population Biology

The advances made possible by the development of molecular techniques have in recent years revolutionized quantitative genetics and its relevance for population genetics. Population Genetics and Microevolutionary Theory takes a modern approach to population genetics, incorporating modern molecular biology, species-level evolutionary biology, and a thorough acknowledgment of quantitative genetics as the theoretical basis for population genetics. Logically organized into three main sections on population structure and history, genotype-

phenotype interactions, and selection/adaptation Extensive use of real examples to illustrate concepts Written in a clear and accessible manner and devoid of complex mathematical equations Includes the author's introduction to background material as well as a conclusion for a handy overview of the field and its modern applications Each chapter ends with a set of review questions and answers Offers helpful general references and Internet links

Population Genomics

An Introduction to Population Genetics

Population biology has been investigated quantitatively for many decades, resulting in a rich body of scientific literature. Ecologists often avoid this literature, put off by its apparently formidable mathematics. This textbook provides an introduction to the biology and ecology of populations by emphasizing the roles of simple mathematical models in explaining the growth and behavior of populations. The author only assumes acquaintance with elementary calculus, and provides tutorial explanations where needed to develop mathematical concepts. Examples, problems, extensive marginal notes and numerous graphs enhance the book's value to students in classes ranging from population biology and population ecology to mathematical biology and mathematical ecology. The book will also be useful as a supplement to introductory courses in ecology.

Evolution and the Genetics of Populations, Volume 2

Conservation and the Genetics of Populations gives acomprehensive overview of the essential background, concepts, andtools needed to understand how genetic information can be used todevelop conservation plans for species threatened withextinction. Provides a thorough understanding of the genetic basis ofbiological problems in conservation. Uses a balance of data and theory, and basic and appliedresearch, with examples taken from both the animal and plantkingdoms. An associated website contains example data sets and softwareprograms to illustrate population genetic processes and methods ofdata analysis. Discussion questions and problems are included at the end ofeach chapter to aid understanding. Features Guest Boxes written by leading people in the fieldincluding James F. Crow, Nancy FitzSimmons, Robert C. Lacy, MichaelW. Nachman, Michael E. Soule, Andrea Taylor, Loren H. Rieseberg,R.C. Vrijenhoek, Lisette Waits, Robin S. Waples and AndrewYoung. Supplementary information designed to support Conservationand the Genetics of Populations including: Downloadable sample chapter Answers to questions and problems Data sets illustrating problems from the book Data analysis software programs Website links An Instructor manual CD-ROM for this title is available. Pleasecontact our Higher Education team at ahref="mailto:HigherEducation@wiley.com"HigherEducation@wiley.com/afor more information.

Genetics of Populations

Population genomics has revolutionized various disciplines of biology including population, evolutionary, ecological and conservation genetics, plant and animal breeding, human health, medicine and pharmacology by allowing to address novel and long-standing questions with unprecedented power and accuracy. It employs large-scale or genome-wide genetic information and bioinformatics to address various fundamental and applied aspects in biology and related disciplines, and provides a comprehensive genome-wide perspective and new insights that were not possible before. These advances have become possible due to the development of new and low-cost sequencing and genotyping technologies and novel statistical approaches and software, bioinformatics tools, and models. Population genomics is tremendously advancing our understanding the roles of evolutionary processes, such as mutation, genetic drift, gene flow, and natural selection, in shaping up genetic variation at individual loci and across the genome and populations; improving the assessment of population genetic parameters or processes such as adaptive evolution, effective population size, gene flow, admixture, inbreeding and outbreeding depression, demography, and biogeography; resolving evolutionary histories and phylogenetic relationships of extant, ancient and extinct species; understanding the genomic basis of fitness, adaptation, speciation, complex ecological and economically important traits, and disease and insect resistance; facilitating forensics, genetic medicine and pharmacology; delineating conservation genetic units; and understanding the genetic effects of resource management practices, and assisting conservation and sustainable management of genetic resources. This Population Genomics book discusses the concepts, approaches, applications and promises of population genomics in addressing most of the above fundamental and applied crucial aspects in a variety of organisms from microorganisms to humans. The book provides insights into a range of emerging population genomics topics including population epigenomics, landscape genomics, seascape genomics, paleogenomics, ecological and evolutionary genomics, biogeography, demography, speciation, admixture, colonization and invasion, genomic selection, and plant and animal domestication. This book fills a vacuum in the field and is expected to become a primary reference in Population Genomics world-wide.

Statistical Population Genomics

Introduction to Forest Genetics examines some of the basic genetic concepts typically used in forestry and tree improvement studies, including Mendelian and population genetics. It also describes techniques that are generally useful in tree improvement work, including individual tree selection and breeding, provenance testing, species and racial hybridization, and introduction of exotics. Organized into 19 chapters, this volume begins with an overview of forest genetics and problems associated with forest genetics. It then discusses concepts from basic genetics, including chromosome structure and function; DNA and RNA; nongenetic inheritance; and genotype versus phenotype. Other chapters focus on inbreeding: complete elimination of homozygous recessive trees; mutation and migration; and controlled pollination and vegetative propagation. The book also covers the establishment and measurement of test plantations; general principles and methods of selective breeding; choice of breeding method and type of seed orchard; heritability and genetic gain; geographic variation in Scotch pine and American trees; species and racial hybridization; chromosome studies; and polyploidy and haploidy breeding. This book is a valuable resource for foresters, professional tree breeders, and those with or without previous training in genetics or forestry.

Statistical Methods in Molecular Evolution

"A text for a one-semester course in population genetics. It introduces students to classical population genetics (in terms of allele and haplotype frequencies) and modern population genetics (in terms of coalescent theory). It presents numerous applications of population genetic methods to practical problems, including testing for natural selection, detecting genetic hitchhiking and inferring the history of populations"--Provided by publisher.

Coalescent Theory

Despite the substantial interest in landscape genetics from the scientific community, learning about the concepts and methods underlying the field remains very challenging. The reason for this is the highly interdisciplinary nature of the field, which combines population genetics, landscape ecology, and spatial statistics. These fields have traditionally been treated separately in classes and textbooks, and very few scientists have received the interdisciplinary training necessary to efficiently teach or apply the diversity of techniques encompassed by landscape genetics. To address the current knowledge gap, this book provides the first in depth treatment of landscape genetics in a single volume. Specifically, this book delivers fundamental concepts and methods underlying the field, covering particularly important analytical methods in detail, and presenting empirical and theoretical applications of landscape genetics for a variety of environments and species. Consistent with the interdisciplinary nature of landscape genetics, the book combines an introductory, textbook like section with additional sections on advanced topics and applications that are more typical of edited volumes. The chapter topics and the expertise of the authors and the editorial team make the book a standard reference for anyone interested in landscape genetics. The book includes contributions from many of the leading researchers in landscape genetics. The group of scientists we have assembled has worked on several collaborative projects over the last years, including a large number of peer reviewed papers, several landscape genetics workshops at international conferences, and a distributed graduate seminar on landscape genetics. Based on the experiences gained during these collaborative teaching and research activities, the book includes chapters that synthesize fundamental concepts and methods underlying landscape genetics (Part 1), chapters on advanced topics that deserve a more in depth treatment (Part 2), and chapters illustrating the use of concepts and methods in empirical applications (Part 3). This structure ensures a high usefulness of the book for beginning landscape geneticists and experienced researchers alike, so that it has a broad target audience. At least one of the four co editors is involved in almost every chapter of the book, thereby ensuring a high consistency and coherency among chapters.

Theories of Population Variation in Genes and Genomes

Research in modern experimental and theoretical population genetics has been strengthened by advances in molecular techniques for the analysis of genetic variability. The evolutionary relationships of organisms may be investigated by comparing DNA sequences. This book covers chapters on population genetics, DNA polymorphism, genetic homeostasis, an

Principles of Population Genetics

The Fourth Edition of Genetics of Populations is the most current, comprehensive, and accessible introduction to the field for advanced undergraduate and graduate students, and researchers in genetics, evolution, conservation, and related fields. In the past several years, interest in the application of population genetics principles to new molecular data has increased greatly, and Dr. Hedrick's new edition exemplifies his commitment to keeping pace with this dynamic area of study. Reorganized to allow students to focus more sharply on key material, the Fourth Edition integrates coverage of theoretical issues with a clear presentation of experimental population genetics and empirical data. Drawing examples from both recent and classic studies, and using a variety of organisms to illustrate the vast developments of population genetics, this text provides students and researchers with the most comprehensive resource in the field.

Understanding Population Genetics

Tracing the development of population genetics through the writings of such luminaries as Darwin, Galton, Pearson, Fisher, Haldane, and Wright, William B. Provine sheds light on this complex field as well as its bearing on other branches of biology.