

a Concise Introduction

COVERS THE FUNDAMENTAL TOPICS IN MATHEMATICS, STATISTICS, AND FINANCIAL MANAGEMENT THAT ARE REQUIRED FOR A THOROUGH STUDY OF FINANCIAL MARKETS This comprehensive yet accessible book introduces students to financial markets and delves into more advanced material at a steady pace while providing motivating examples, poignant remarks, counterexamples, ideological clashes, and intuitive traps throughout. Tempered by real-life cases and actual market structures, *An Introduction to Financial Markets: A Quantitative Approach* accentuates theory through quantitative modeling whenever and wherever necessary. It focuses on the lessons learned from timely subject matter such as the impact of the recent subprime mortgage storm, the collapse of LTCM, and the harsh criticism on risk management and innovative finance. The book also provides the necessary foundations in stochastic calculus and optimization, alongside financial modeling concepts that are illustrated with relevant and hands-on examples. *An Introduction to Financial Markets: A Quantitative Approach* starts with a complete overview of the subject matter. It then moves on to sections covering fixed income assets, equity portfolios, derivatives, and advanced optimization models. This book's balanced and broad view of the state-of-the-art in financial decision-making helps provide readers with all the background and modeling tools needed to make "honest money" and, in the process, to become a sound professional. Stresses that gut feelings are not always sufficient and that "critical thinking" and real-world applications are appropriate when dealing with complex social systems involving multiple players with conflicting incentives Features a related website that contains a solution manual for end-of-chapter problems Written in a modular style for tailored classroom use Bridges a gap for business and engineering students who are familiar with the problems involved, but are less familiar with the methodologies needed to make smart decisions *An Introduction to Financial Markets: A Quantitative Approach* offers a balance between the need to illustrate mathematics in action and the need to understand the real life context. It is an ideal text for a first course in financial markets or investments for business, economic, statistics, engineering, decision science, and management science students.

Praise for the Third Edition "... guides and leads the reader through the learning path ... [e]xamples are stated very clearly and the results are presented with attention to detail." —MAA Reviews Fully updated to reflect new developments in the field, the Fourth Edition of *Introduction to Optimization* fills the need for accessible treatment of optimization theory and methods with an emphasis on engineering design. Basic definitions and notations are provided in addition to the related fundamental background for linear algebra, geometry, and calculus. This new edition explores the essential topics of unconstrained optimization problems, linear programming problems, and nonlinear constrained optimization. The authors also present an optimization perspective on global search methods and include discussions on genetic algorithms, particle swarm optimization, and the simulated annealing algorithm.

Featuring an elementary introduction to artificial neural networks, convex optimization, and multi-objective optimization, the Fourth Edition also offers: A new chapter on integer programming Expanded coverage of one-dimensional methods Updated and expanded sections on linear matrix inequalities Numerous new exercises at the end of each chapter MATLAB exercises and drill problems to reinforce the discussed theory and algorithms Numerous diagrams and figures that complement the written presentation of key concepts MATLAB M-files for implementation of the discussed theory and algorithms (available via the book's website) *Introduction to Optimization, Fourth Edition* is an ideal textbook for courses on optimization theory and methods. In addition, the book is a useful reference for professionals in mathematics, operations research, electrical engineering, economics, statistics, and business.

A PRACTICAL GUIDE TO OPTIMIZATION PROBLEMS WITH DISCRETE OR INTEGER VARIABLES, REVISED AND UPDATED The revised second edition of *Integer Programming* explains in clear and simple terms how to construct custom-made algorithms or use existing commercial software to obtain optimal or near-optimal solutions for a variety of real-world problems. The second edition also includes information on the remarkable progress in the development of mixed integer programming solvers in the 22 years since the first edition of the book appeared. The updated text includes information on the most recent developments in the field such as the much improved preprocessing/presolving and the many new ideas for primal heuristics included in the solvers. The result has been a speed-up of several orders of magnitude. The other major change reflected in the text is the widespread use of decomposition algorithms, in particular column generation (branch-and-cut-and-price) and Benders' decomposition. The revised second edition: Contains new developments on column generation Offers a new chapter on Benders' algorithm Includes expanded information on preprocessing, heuristics, and branch-and-cut Presents several basic and extended formulations, for example for fixed cost network flows Also touches on and briefly introduces topics such as non-bipartite matching, the complexity of extended formulations or a good linear program for the implementation of lift-and-project Written for students of integer/mathematical programming in operations research, mathematics, engineering, or computer science. *Integer Programming* offers an updated edition of the basic text that reflects the most recent developments in the field.

A unique interdisciplinary foundation for real-world problemsolving Stochastic search and optimization techniques are used in a vast number of areas, including aerospace, medicine, transportation, and finance, to name but a few. Whether the goal is refining the design of a missile or aircraft, determining the effectiveness of a new drug, developing the most efficient timing strategies for traffic signals, or making investment decisions in order to

increase profits, stochastic algorithms can help researchers and practitioners devise optimal solutions to countless real-world problems. *Introduction to Stochastic Search and Optimization: Estimation, Simulation, and Control* is a graduate-level introduction to the principles, algorithms, and practical aspects of stochastic optimization, including applications drawn from engineering, statistics, and computer science. The treatment is both rigorous and broadly accessible, distinguishing this text from much of the recurrent literature and providing students, researchers, and practitioners with a strong foundation for the often-daunting task of solving real-world problems. The text covers a broad range of today's most widely used stochastic algorithms, including: Random search Recursive linear estimation Stochastic approximation Simulated annealing Genetic and evolutionary methods Machine (reinforcement) learning Model selection Simulation-based optimization Markov chain Monte Carlo Optimal experimental design The book includes over 130 examples, Web links to software and data sets, more than 250 exercises for the reader, and an extensivist of references. These features help make the text an invaluable resource for those interested in the theory or practice of stochastic search and optimization.

Service Science

Optimization Modeling with Spreadsheets

High-Performance Bridges and Buildings of the Future

An Introduction

Linear and Convex Optimization

Modeling with MATLAB, @Risk, or VBA

Reflects the latest applied research and features state-of-the-art software for building and solving spreadsheet optimization models Thoroughly updated to reflect the latest topical and technical advances in the field, *Optimization Modeling with Spreadsheets, Second Edition* continues to focus on solving real-world optimization problems through the creation of mathematical models and the use of spreadsheets to represent and analyze those models. Developed and extensively classroom-tested by the author, the book features a systematic approach that equips readers with the skills to apply optimization tools effectively without the need to rely on specialized algorithms. This new edition uses the powerful software package Risk Solver Platform (RSP) for optimization, including its Evolutionary Solver, which employs many recently developed ideas for heuristic programming. The author provides expanded coverage of integer programming and discusses linear and nonlinear programming using a systematic approach that emphasizes the use of spreadsheet-based optimization tools. The Second Edition also features: Classifications for the various problem types, providing the reader with a broad framework for building and recognizing optimization models Network models that allow for a more general form of mass balance A systematic introduction to Data Envelopment Analysis (DEA) The identification of qualitative patterns in order to meaningfully interpret linear programming solutions An introduction to stochastic programming and the use of RSP to solve problems of this type Additional examples, exercises, and cases have been included throughout, allowing readers to test their comprehension of the material. In addition, a related website features Microsoft Office® Excel files to accompany the figures and data sets in the book. With its accessible and comprehensive presentation, *Optimization Modeling with Spreadsheets, Second Edition* is an excellent book for courses on deterministic models, optimization, and spreadsheet modeling at the upper-undergraduate and graduate levels. The book can also serve as a reference for researchers, practitioners, and consultants working in business, engineering, operations research, and management science.

A timely book on a topic that has witnessed a surge of interest over the last decade, owing in part to several novel applications, most notably in data compression and computational molecular biology. It describes methods employed in average case analysis of algorithms, combining both analytical and probabilistic tools in a single volume. * Tools are illustrated through problems on words with application to molecular biology, data compression, security, and pattern matching. * Includes chapters on algorithms and data structures on words, probabilistic and analytical models, inclusion-exclusion principles, first and second moment methods, subadditive ergodic theorem and large deviations, elements of information theory, generating functions, complex asymptotic methods, Mellin transform and its applications, and analytic poissonization and depoissonization. * Written by an established researcher with a strong international reputation in the field.

A timely, accessible introduction to the mathematics of chaos. The past three decades have seen dramatic developments in the theory of dynamical systems, particularly regarding the exploration of chaotic behavior. Complex patterns of even simple processes arising in biology, chemistry, physics, engineering, economics, and a host of other disciplines have been investigated, explained, and utilized. *Introduction to Discrete Dynamical Systems and Chaos* makes these exciting and important ideas accessible to students and scientists by assuming, as a background, only the standard undergraduate training in calculus and linear algebra. Chaos is introduced at the outset and is then incorporated as an integral part of the theory of discrete dynamical systems in one or more dimensions. Both phase space and parameter space analysis are developed with ample exercises, more than 100 figures, and important practical examples such as the dynamics of atmospheric changes and neural networks. An appendix provides readers with clear guidelines on how to use Mathematica to explore discrete dynamical systems numerically. Selected programs can also be downloaded from a Wiley FTP site (address in preface). Another appendix lists possible projects that can be assigned for classroom investigation. Based on the author's 1993 book, but boasting at least 60% new, revised, and updated material, the present *Introduction to Discrete Dynamical Systems and Chaos* is a unique and extremely useful resource for all scientists interested in this active and intensely studied field. An Instructor's Manual presenting detailed solutions to all the problems in the book is available upon request from the Wiley editorial department.

This is the first book devoted entirely to Particle Swarm Optimization (PSO), which is a non-specific algorithm, similar to evolutionary algorithms, such as taboo search and ant colonies. Since its original development in 1995, PSO has mainly been applied to continuous-discrete heterogeneous strongly non-linear numerical optimization and it is thus used almost everywhere in the world. Its convergence rate also makes it a preferred tool in dynamic optimization.

Parallel Metaheuristics

From Theory to Applications in Python

Methods and Applications

Combinatorial Optimization

Theory and Applications to Power Systems

Optimization of Computer Networks

Over the last few decades, optimization techniques have been streamlined by the use of computers and artificial intelligence methods to analyze more variables (especially under non-linear, multivariable conditions) more quickly than ever before. This book covers all classical linear and nonlinear optimization techniques while focusing on the standard mathematical engine, MATLAB. As with the first edition, the author uses MATLAB in examples for running computer-based optimization problems. New coverage in this edition includes design optimization techniques such as Multidisciplinary Optimization, Explicit Solution for Boundary Value Problems, and Particle Swarm Optimization.

An introduction to the theory and practice of financial simulation and optimization In recent years, there has been a notable increase in the use of simulation and optimization methods in the financial industry. Applications include portfolio allocation, risk management, pricing, and capital budgeting under uncertainty. This accessible guide provides an introduction to the simulation and optimization techniques most widely used in finance, while at the same time offering background on the financial concepts in these applications. In addition, it clarifies difficult concepts in traditional models of uncertainty in finance, and teaches you how to build models with software. It does this by reviewing current simulation and optimization methodology along with available software and proceeds with portfolio risk management, modeling of random processes, pricing of financial derivatives, and real options applications. Contains a unique combination of finance theory and rigorous mathematical modeling emphasizing a hands-on approach through implementation with software Highlights not only classical applications, but also more recent developments, such as pricing of mortgage-backed securities Includes models and code in both spreadsheet-based software (@Risk, Solver, Evolver, VBA) and mathematical modeling software (MATLAB) Filled with in-depth insights and practical advice, Simulation and Optimization Modeling in Finance offers essential guidance on some of the most important topics in financial management.

Radio Network Planning and Optimisation for UMTS, Second Edition, is a comprehensive and fully updated introduction to WCDMA radio access technology used in UMTS, featuring new content on key developments. Written by leading experts at Nokia, the first edition quickly established itself as a best-selling and highly respected book on how to dimension, plan and optimise UMTS networks. This valuable text examines current and future radio network management issues and their impact on network performance as well as the relevant capacity and coverage enhancement methods. In addition to coverage of WCDMA radio access technology used in UMTS, and the planning and optimisation of such a system, the service control and management concept in WCDMA and GPRS networks are also introduced. This is an excellent source of information for those considering future cellular networks where Quality of Service (QoS) is of paramount importance. Key features of the Second Edition include: High-Speed Downlink Packet Access (HSDPA) – physical layer, dimensioning and radio resource management Quality of Service (QoS) mechanisms in network for service differentiation Multiple Input - Multiple Output (MIMO) technology Practical network optimisation examples Service optimisation for UMTS and GPRS/EDGE capacity optimisation The 'hot topic' of service control and management in WCDMA and GPRS networks, that has evolved since the first edition Companion website includes: Figures Static radio network simulator implemented in MATLAB® This text will have instant appeal to wireless operators and network and terminal manufacturers. It will also be essential reading for undergraduate and postgraduate students, frequency regulation bodies and all those interested in radio network planning and optimisation, particularly RF network systems engineering professionals.

Pharmacokinetic Properties of Functional Groups and Organic Compounds

Introduction to Stochastic Search and Optimization

Particle Swarm Optimization