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## Mathematics

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Algebra (general)

Forthcoming

G. Shimura

Arithmetic of Quadratic Forms

This book is divided in two parts. The first part is preliminary and consists of algebraic number theory and the theory of semisimple algebras. There are two principal topics: classification of quadratic forms and quadratic diophantine equations. The first topic is further divided into two types of theories: classification over an algebraic number field and classification over the ring of algebraic integers. To ensure the book would be concise, the author proved basic theorems in local class field theory only in some special cases, and the Hilbert reciprocity law only over the rational number field. However, the author stated the main theorems with an arbitrary number field as the base field, so the reader familiar with class field theory will be able to learn the arithmetic theory of quadratic forms with no further references. Goro Shimura is Professor Emeritus at Princeton University.

More on www.springer.com/978-1-4419-1731-7

Due May 2010


978-1-4419-1731-7 ► approx. 73,40 €

Algebra, Arithmetic, and Geometry

Volume I: In Honor of Yu. I. Manin


Due January 2010

2009. Approx. 765 p. 41 illus. (Progress in Mathematics, 269)

978-0-8176-4744-5 ► approx. 129,95 €

Algebra, Arithmetic, and Geometry

Volume II: In Honor of Yu. I. Manin


More on www.springer.com/978-0-8176-4746-9

Due February 2010

2010. Approx. 600 p. 15 illus. (Progress in Mathematics, 270)

978-0-8176-4746-9 ► approx. 76,25 €

Algebraic Geometry

M.E. Alonso, E. Arrondo, R. Mallavibarrena, I. Sols

Liaison, Schottky Problem and Invariant Theory

Remembering Federico Gaeta

This volume is a homage to the memory of the Spanish mathematician Federico Gaeta (1923–2007). Apart from a historical presentation of his life and interaction with the classical Italian school of algebraic geometry, the volume presents surveys and original research papers on the mathematics he studied. Specifically, it is divided into three parts: linkage theory, Schottky problem and invariant theory. On this last topic a hitherto unpublished article by Federico Gaeta is also included.

More on www.springer.com/978-3-0346-0200-6

Due February 2010

2010. Approx. 300 p. (Progress in Mathematics, 280)

978-3-0346-0200-6 ► 69,95 €
Higher Dimensional Algebraic Geometry

This book focuses on recent advances in the classification of complex projective varieties. It is divided into two parts. The first part gives a detailed account of recent results in the minimal model program. In particular, it contains a complete proof of the theorems on the existence of flips, on the existence of minimal models for varieties of log general type and of the finite generation of the canonical ring. The second part is an introduction to the theory of moduli spaces. It includes topics such as representing and moduli functors, Hilbert schemes, the boundedness, local closedness and separatedness of moduli spaces and the boundedness for varieties of general type. The book is aimed at graduate students and researchers in algebraic geometry.

More on www.springer.com/978-3-0346-0289-1
Due April 2010
2010. Approx. 200 p. (Oberwolfach Seminars, 43)
978-3-0346-0289-1  ► 24,95 €

Forthcoming
G. Kemper

A Course in Commutative Algebra

Kemper's "Course in Commutative Algebra" presents a thorough, modern introduction to the subject. With carefully selected topics presented in a natural geometric context, the author's key focus is on concepts and results in the field. But, while emphasizing theory, the presentation is enriched with three chapters covering computational aspects of the subject. This user-friendly textbook motivates the reader with numerous examples, figures, and exercises, and is well designed for a one- or two-semester course in a classroom setting.

More on www.springer.com/978-3-642-03544-9
Due April 2010
2010. Approx. 240 p. (Graduate Texts in Mathematics, 256)
978-3-642-03544-9  ► 49,95 €

Forthcoming
A. Shen

Algorithms

Problems and Solutions

"Algorithms and Programming" is primarily intended for a first year undergraduate course in programming. Structured in a problem-solution format, the text motivates the student to think through the programming process, thus developing a firm understanding of the underlying theory. Although a moderate familiarity with programming is assumed, the book is easily utilized by students new to computer science. The more advanced chapters make the book useful for a graduate course in the analysis of algorithms and/ or compiler construction. New to the second edition are added chapters on suffix trees, games and strategies, and Huffman coding as well as an appendix illustrating the ease of conversion from Pascal to C. The material covers such topics as combinatorics, sorting, searching, queues, grammar and parsing, selected well-known algorithms, and much more.

More on www.springer.com/978-0-8176-4874-9
Due January 2010
2010. XX, 207 p. 1 illus. (Progress in Mathematics, 278)
978-0-8176-4874-9  ► 89,95 €

Forthcoming
C. Hacon, S. Kovács

Selected Papers

Volume II

From the reviews of Volume I: "I am quite happy to keep this volume on my shelf, and I will surely find many more seeds in it that grew so large that by now their origins are hard to recognize." Janos Kollar, Bulletin of the AMS. "...a highly valuable and welcome collection for every researcher in the field. ... Further generations of researchers in this field, graduate students, mathematical physicists, and mathematical historians will profit a great deal from this collection of selected papers..." Werner Kleinert, Zentralblatt MATH. These 30+ articles span the years from 1961-1980 while David Mumford was an active researcher in the area of algebraic geometry. While Volume I was very successful, there were papers which were left out, and will now be included here, such as Mumford's paper with Pierre Deligne, The Irreducibility of the space of curves of given genus (1969). Mumford's correspondence with Grothendieck will also be included.

More on www.springer.com/978-0-387-72491-1
Due March 2010
2010. Approx. 785 p. 68 illus. (Springer Monographs in Mathematics)
978-0-387-72491-1  ► 129,95 €

Analysis (general)

A Problem Book in Real Analysis

Today, nearly every undergraduate mathematics program requires at least one semester of real analysis. Often, students consider this course to be the most challenging or even intimidating of all their mathematics major requirements. The primary goal of A Problem Book in Real Analysis is to alleviate those concerns by systematically solving the problems related to the core concepts of most analysis courses. In doing so, the authors hope that learning analysis becomes less taxing and more satisfying. The wide variety of exercises presented in this book range from the computational to the more conceptual and varies in difficulty. They cover the following subjects: set theory; real numbers; sequences; limits of the functions; continuity; differentiability; integration; series; metric spaces; sequences; and series of functions and fundamentals of topology. Furthermore, the authors define the concepts and cite the theorems used at the beginning of each chapter. A Problem Book in Real Analysis is not simply a collection of problems; it will stimulate its readers to independent thinking in dis-
covering analysis. Prerequisites for the reader are a robust understanding of calculus and linear algebra.

More on www.springer.com/978-1-4419-1295-4

Due January 2010

### A Course in Multivariable Calculus and Analysis

This self-contained textbook gives a thorough exposition of multivariable calculus. It can be viewed as a sequel to the one-variable calculus text, *A Course in Calculus and Real Analysis*, published in the same series. The emphasis is on correlating general concepts and results of multivariable calculus with their counterparts in one-variable calculus. For example, when the general definition of the volume of a solid is given using triple integrals, the authors explain why the shell and washer methods of one-variable calculus for computing the volume of a solid of revolution must give the same answer. Further, the book includes genuine analogues of basic results in one-variable calculus, such as the mean value theorem and the fundamental theorem of calculus. This book is distinguished from others on the subject: it examines topics not typically covered, such as monotonicity, bimonotonicity, and convexity, together with their relation to partial differential equations.

More on www.springer.com/978-1-4419-1620-4

Due January 2010

### Around the Research of Vladimir Maz'ya I: Function Spaces

International Mathematical Series Volume 11: *Around the Research of Vladimir Maz'ya I*Function Spaces*Edited by Ari Laptev* Professor Maz'ya is one of the foremost authorities in various fields of functional analysis and partial differential equations. In particular, Maz'ya is a prominent figure in the development of the theory of Sobolev spaces. He is the author of the well-known monograph *Sobolev Spaces* (Springer, 1985). Professor Maz'ya is one of the foremost authorities in various fields of functional analysis and partial differential equations. In particular, Maz'ya is a prominent figure in the development of the theory of Sobolev spaces. He is the author of the well-known monograph *Sobolev Spaces* (Springer, 1985). The following topics are discussed in this volume: Orlicz-Sobolev spaces, weighted Sobolev spaces, Besov spaces with negative exponents, Dirichlet spaces and related variational capacities, classical inequalities, including Hardy inequalities (multidimensional versions, the case of fractional Sobolev spaces etc.), Hardy-Maz'ya-Sobolev analogs, a general version of Maz'ya's isocapacitary inequalities in a measure-metric space setting, Hardy type, Sobolev, Poincare, and pseudo-Poincare inequalities in different contexts including Riemannian manifolds, measure-metric spaces, and fractional spaces.

The Maz'ya's capacity analogue of the coarea inequality in metric probability spaces, sharp constants, extension operators, geometry of hypersurfaces in Carnot groups, Sobolev homeomorphisms, a converse to the Maz'ya inequality for capacities and applications of Maz'ya's capacity method. Contributors include: Farit Avkhadiev (Russia) and Ari Laptev (UK—Sweden); Sergey Bobkov (USA) and Boguslaw Zegarliński (UK); Andrea Cianchi (Italy); Martin Costabel (France), Monique Dauge (France), and Serge Nicolaïse (France); Stathis Filippas (Greece), Achilles Tertikas (Greece), and Jesper Tidblom (Austria); Rupert L. Frank (USA) and Robert Seiringer (USA); Nicola Garofalo (USA—Italy) and Christina Selby (USA); Vladimir Gol'dshtein (Israel) and Aleksandr Ukhlov (Israel); Niels Jacob (UK) and Rene L. Schilling (Germany); Juha Kinnunen (Finland) and Ruikka Korte (Finland); Pekka Koskela (Finland), Michele Miranda Jr. (Italy), and Nageswari Shanmugalingam (USA); Moshe Marcus (Israel) and Laurent Veron (France); Joaquim Martin (Spain) and Mario Milman (USA); Eric M'bako (USA) and Umberto Mosco (USA); Emmanuel Milman (USA); Laurent Saloff-Coste (USA); Jie Xiao (USA) Ari Laptev -Imperial College London (UK) and Royal Institute of Technology (Sweden). Ari Laptev is a world-recognized specialist in Spectral Theory of Differential Operators. He is the President of the European Mathematical Society for the period 2007-2010. Tamara Rozhkovskaya - Sobolev Institute of Mathematics SB RAS (Russia) and an independent publisher. Editors and Authors are exclusively invited to contribute to volumes highlighting recent advances in various fields of mathematics by the Series Editor and a founder of the IMS Tamara Rozhkovskaya.

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### Around the Research of Vladimir Maz'ya II: Partial Differential Equations

International Mathematical Series Volume 12: *Around the Research of Vladimir Maz'ya II*Partial Differential Equations*Edited by Ari Laptev*Numerous influential contributions of Vladimir Maz'ya to PDEs are related to diverse areas. In particular, the following topics, close to the scientific interests of V. Maz'ya are discussed: semilinear elliptic equation with an exponential nonlinearity resolvents, eigenvalues, and eigenfunctions of elliptic operators in perturbed domains, homogenization, asymptotics for the Laplace-Dirichlet equation in a perturbed polygonal domain, the Navier-Stokes equation on Lipschitz domains in Riemannian manifolds, non-degenerate quasilinear subelliptic equations of p-Laplacian type, singular perturbations of elliptic systems, elliptic inequalities in Riemannian manifolds, polynomial solutions to the Dirichlet problem, the first Neumann eigenvalues for a conformal class of Riemannian metrics, the boundary regularity for quasilinear equations, the problem on a steady flow over a two-dimensional obstacle, the well posedness and asymptotics for the Stokes equation, integral equations for harmonic single layer potential in domains with cusps, the Stokes equations in a convex polyhedron, periodic scattering problems, the Neumann problem for 4th order differential operators. Contributors include: Catherine Bandle (Switzerland), Vitaly Moroz (UK), and Wolfgang Reichel (Germany); Gerasimos Barbatis (Greece), Victor I. Burenkov (Italy), and Pier Domenico Lamberti (Italy); Grigori Chechkin (Russia); Monique Dauge (France), Sebastien Tordeux (France), and Gregory Vial (France); Martin Dindos (UK); Andras Domokos (USA) and Juan J. Manfredi (USA); Yuri V. Egorov (France), Nicolas Meunier (France), and Evariste S.R. Ghorpade, B.V. Limaye

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This self-contained textbook gives a thorough exposition of multivariable calculus. It can be viewed as a sequel to the one-variable calculus text, *A Course in Calculus and Real Analysis*, published in the same series. The emphasis is on correlating general concepts and results of multivariable calculus with their counterparts in one-variable calculus. For example, when the general definition of the volume of a solid is given using triple integrals, the authors explain why the shell and washer methods of one-variable calculus for computing the volume of a solid of revolution must give the same answer. Further, the book includes genuine analogues of basic results in one-variable calculus, such as the mean value theorem and the fundamental theorem of calculus. This book is distinguished from others on the subject: it examines topics not typically covered, such as monotonicity, bimonotonicity, and convexity, together with their relation to partial differential equations, cubature rules for approximate evaluation of double integrals, and conditional as well as unconditional convergence of double series and improper double integrals. Moreover, the emphasis is on a geometric approach to such basic notions as local extremum and saddle point. Each chapter contains detailed proofs of relevant results, along with numerous examples and a wide collection of exercises of varying degrees of difficulty, making the book useful to undergraduate and graduate students alike. There is also an informative section of “Notes and Comments” indicating some novel features of the treatment of topics in that chapter as well as references to relevant literature. The only prerequisite for this text is a course in one-variable calculus.

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10. X, 254 p. 17 illus., 8 in color. (Problem Books in Mathematics.)

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Due February 2010

2010. XXII, 385 p. 3 illus. (International Mathematical Series, 12)
978-1-4419-1342-5 ► 109,95 €

Forthcoming

N. Lerner

Metrics on the Phase Space and Non-Selfadjoint Pseudo-Differential Operators

This book is devoted to the study of pseudo-differential operators, with special emphasis on non-self-adjoint operators, a priori estimates and localization in the phase space. We expose the most recent developments of the theory with its applications to local solvability and semi-classical estimates for nonselfadjoint operators. The first chapter is introductory and gives a presentation of classical classes of pseudo-differential operators. The second chapter is dealing with the general notion of metrics on the phase space. We expose some elements of the so-called Wick calculus and introduce general Sobolev spaces attached to a pseudo-differential calculus. The third and last chapter, is devoted to the topic of non-selfadjoint pseudo-differential operators. After some introductory examples, we enter into the discussion of estimates with loss of one derivative, starting with the proof of local solvability with loss of one derivative under condition (P). We show that an estimate with loss of one derivative is not a consequence of condition (Ps). Finally, we give a proof of an estimate with loss of 3/2 derivatives under condition (Ps). This book is accessible to graduate students in Analysis, and provides an up-to-date overview of the subject, hopefully useful to researchers in PDE and Semi-classical Analysis.

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Due January 2010

2010. XII, 397 p. (Pseudo-Differential Operators, 3)
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A. Laptev

Around the Research of Vladimir Maz’ya III

Analysis and Applications

International Mathematical Series Volume 13

Around the Research of Vladimir Maz’ya III Analysis and Applications
Edited by Ari Laptev More than 450 research articles and 20 books by Prof. Maz’ya contain numerous fundamental results and fruitful techniques which have strongly influenced the development of many branches in Analysis and, in particular, the topics discussed in this volume: problems with biharmonic differential operators, the minimal thickness of non-tangentially accessible domains, the Lp-dissipativity of partial differential operators and the Lp-contractivity of the generated semigroups, uniqueness and nonuniqueness in inverse hyperbolic problems and the existence of black (white) holes, global exponential bounds for Green’s functions for differential and integral equations with possibly singular coefficients, data, and boundaries of the domains, properties of spectral minimal partitions, the boundedness of integral operators from Besov spaces on the boundary of a Lipschitz domain into weighted Sobolev spaces of functions in the domain, the Cwikel-Lieb-Rozenblum and Lieb-Thirring inequalities for operators on functions in metric spaces, spectral problems with the Schrodinger operator, the Weyl formula for the Laplace operator on a domain under minimal assumptions on the boundary, a degenerate oblique derivative problem for second order uniformly elliptic operators, weighted inequalities with the Hardy operator in the integral and supremum form, finite rank Toeplitz operators and applications, the resolvent of a non-selfadjoint pseudodifferential operator. Contributors include: David R. Adams (USA), Volodymyr Hrynkiv (USA), and Suzanne Lenhart (USA); Hiroaki Aikawa (Japan); Alberto Cialdea (Italy); Gregory Eskin (USA); Michael W. Frazier (USA) and Igor E. Verbitsky (USA); Bernard Helffer (France), Thomas Hoffmann-Ostenhof (Austria), and Susanna Terracini (Italy); Dorina Mitrea (USA), Marius Mitrea (USA), and Sylvie Monniaux (France); Stanislav Molchanov (USA) and Boris Vainberg (USA); Yuri Netrusov (UK) and Yuri Safarov (UK); Dian K. Palagachev (Italy); Lubos Pick (Czech Republic); Grigori Rozenblum (Sweden); Johannes Sjostrand (France). Ari Laptev Imperial College London (UK) and Royal Institute of Technology (Sweden). Ari Laptev is a world-recognized specialist in Spectral Theory of Differential Operators. He is the President of the European Mathematical Society for the period 2007-2010. Tamara Rozhkovskaya Sobolev Institute of Mathematics SB RAS (Russia) and an independent publisher. Editors and Authors are exclusively invited to contribute to volumes highlighting recent advances in various fields of mathematics by the Series Editor and a founder of the IMS Tamara Rozhkovskaya. Cover image: Vladimir Maz’ya

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2010. XXI, 386 p. 3 illus. (International Mathematical Series, 13)
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A. Laptev

Around the Research of Vladimir Maz’ya I - III

Function Spaces, Partial Differential Equations, Analysis and Applications

Research articles and surveys from world-recognized mathematicians cover large areas in Analysis where the contributions of Prof. Maz’ya are fundamental, influential, and/or pioneering. Recent advantages in the study of Sobolev type spaces, PDEs and important boundary value problems in mathematical physics, spectral problems, asymptotic expansions, various actual problems in Analysis and applications are presented. Archive photos and List of references to Maz’ya’s works companion the collection.

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Due February 2010

978-1-4419-1346-3 ► 279,00 €

Forthcoming

N. Bingham, J. Fry

Regression

Linear Models in Statistics

Regression is the branch of Statistics in which a dependent variable of interest is modelled as a linear combination of one or more predictor variables together with a random error. Because the subject is inherently two- or higher-dimensional, and one should first meet Statistics in one dimension, this book presupposes some prior knowledge of Statistics.
But these prerequisites are minimal: the contents of any first course in Statistics will suffice. In addition to a first course in (one-dimensional) Statistics, important pre-requisites are a first course in Probability and some knowledge of standard Linear Algebra. Here the book’s needs are well served within the SUMS series, by John Haigh’s Probability Models and by the two volumes Basic Linear Algebra and Further Linear Algebra by T. S. Blyth and E. F. Robertson. The book begins with simple linear regression (one predictor variable), and analysis of variance (ANOVA). It goes on to multiple linear regression (several predictor variables), analysis of covariance (ANCOVA), tests of linear hypotheses, departures from standard test conditions, and generalised linear models (GLMs). It concludes with special topics such as non-parametric regression and mixed models, time series, spatial processes and design of experiments. There are many worked examples and exercises with full solutions.

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Calculus of Variations and Optimal Control; Optimization

An Introduction to Analysis, Adaptivity and Multigrid for Variational Inequalities

Variational inequalities provide the mathematical framework for a variety of nonlinear and non-smooth phenomena in science and engineering. Efficient and reliable solution procedures are closely linked to the mathematics of function spaces and partial differential equations. The main subjects of this book are posteriori error analysis and convergence of adaptive finite element methods, the treatment of multigrid methods and multilevel methods with solution-dependent multilevel bases. The discussion is centered around some model obstacle and contact problems and based upon introductory sections on the mathematics of variational inequalities and on finite element discretisation including short MATLAB programs.

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Due March 2010

2010. Approx. 180 p. (Oberwolfach Seminars, 42)
978-3-0346-0068-2 ▶ 24,95 €

Handbook of Power Systems

Energy is one of the world’s most challenging problems, and power systems are an important aspect of energy related issues. The Handbook of Power Systems contains state-of-the-art contributions on power systems modeling. In particular, it covers topics like operation planning, expansion planning, transmission and distribution modelling, computing technologies in energy systems, energy auctions, risk management, market regulation, stochastic programming in energy, and forecasting in energy. The book is separated into nine sections, which cover the most important areas of energy systems. The contributions are authored by recognized specialists in their fields and consist in either state-of-the-art reviews or examinations of state-of-the-art developments. The articles are not purely theoretical, but instead also discuss specific applications in power systems.

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Due March 2010

978-3-642-02492-4 ▶ approx. 249,95 €

Combinatorics

Geometry of Cuts and Metrics

Cuts and metrics are well-known objects that arise independently, but with many deep and fascinating connections – in diverse fields: in graph theory, combinatorial optimization, geometry of numbers, distance geometry, combinatorial matrix theory, statistical physics, VLSI design etc. A main feature of this book is its interdisciplinarity. The book contains a wealth of results, from different mathematical disciplines, which are presented here in a unified and comprehensive manner. Geometric representations and methods turn out to be the linking theme. This book will provide a unique and invaluable source for researchers and graduate students. From the Reviews: “This book is a beautiful piece of interdisciplinary research. It draws from the interdisciplinarity of these fields as it gathers methods and results from polytope theory, geometry of numbers, probability theory, design and graph theory around two objects, cuts and metrics. […] The book is very nicely written […] The book is also very well structured. With knowledge about the relevant terms, one can enjoy special subsections without being entirely familiar with the rest of the chapter. This makes it not only an interesting research book but even a dictionary. […] In my opinion, the book is a beautiful piece of work. The longer one works with it, the more beautiful it becomes.” Robert Weismantel, Optimål 56 (1997) “… In short, this is a very interesting book which is nice to have.” Alexander I. Barvinok, MR 1460588 (98g:52001) “… This is a large and fascinating book. As befits a book which contains material relevant
to so many areas of mathematics (and related disciplines such as statistics, physics, computing science, and economics), it is self-contained and written in a readable style. Moreover, the index, bibliography, and table of contents are all that they should be in such a work; it is easy to find as much or as little introductory material as needed." R. Dawson, Zentralblatt MATH Database 0885.52001

More on www.springer.com/978-3-642-04294-2
Due January 2010
2010. XII, 587 p. 107 illus. (Algorithms and Combinatorics, 15)
978-3-642-04294-2 ▶ 99,95 €

Computational Mathematics
and Numerical Analysis
(general)

S.L. Campbell, J. Chancelier, R. Nikoukhah

Modeling and Simulation in Scilab/Scicos with ScicosLab 4.4

ScicosLab is a free open-source software package for scientific computation. It includes a Scilab interpreter and hundreds of general purpose and specialized functions for numerical computation, organized in libraries called toolboxes, which cover such areas as simulation, optimization, systems and control, and signal processing. One important ScicosLab toolbox is Scicos. Scicos provides a block diagram graphical editor for the construction and simulation of dynamical systems. The objective of this book is to provide a tutorial for the use of Scilab/Scicos with a special emphasis on modeling and simulation tools. The book is based on the new ScicosLab 4.4. While the book will provide useful information to experienced users it is designed to be accessible to beginning users from a variety of disciplines. Students and academic and industrial scientists and engineers should find it useful. The book is divided into two parts. The first part concerns Scilab and includes a tutorial covering the language features, the data structures and specialized functions for doing graphics, importing, exporting data and interfacing external routines. It also covers in detail the numerical solvers for ordinary differential equations and differential-algebraic equations available in ScicosLab. Even though the emphasis is placed on modeling and simulation applications, this part provides a global view of the Scilab language. The second part is dedicated to modeling and simulation of dynamical systems in Scicos. This type of modeling tool is widely used in industry because it provides a means for constructing modular and reusable models. This part contains a detailed description of the editor and its usage, which is illustrated through numerous examples. All codes used in the book are made available to the reader. This book is an updated and expanded version of an earlier edition based on Scilab 3.1. Stephen L. Campbell is a professor of mathematics and director of graduate programs at North Carolina State University, a fellow of the IEEE, and has published extensively on numerical methods and control. Jean-Philippe Chancelier is affiliated with CERMICS Ecole Nationale des Ponts et Chaussées and is one of the original developers of Scilab. Ramine Nikoukhah is a director of research at INRIA (The French National Institute for Research in Computer Science and Control), senior member of IEEE, one of the original developers of Scilab, and is the creator of Scicos.

Due January 2010
978-1-4419-5526-5 ▶ 59,95 €

Forthcoming
W. Chaowalitwongse, P.M. Pardalos, P. Xanthopoulos

Computational Neuroscience

The human brain is among the most complex systems known to mankind. Neuroscientists seek to understand brain function through detailed analysis of neuronal excitability and synaptic transmission. Only in the last few years has it become feasible to capture simultaneous responses from a large enough number of neurons to empirically test the theories of human brain function computationally. This book is comprised of state-of-the-art experiments and computational techniques that provide new insights and improve our understanding of the human brain. This volume includes contributions from diverse disciplines including electrical engineering, biomedical engineering, industrial engineering, and medicine, bridging a vital gap between the mathematical sciences and neuroscience research. Covering a wide range of research topics, this volume demonstrates how various methods from data mining, signal processing, optimization and cutting-edge medical techniques can be used to tackle the most challenging problems in modern neuroscience. The results presented in this book are of great interest and value to scientists, graduate students, researchers and medical practitioners interested in the most recent developments in computational neuroscience.

Due April 2010
2010. Approx. 410 p. 115 illus., 40 in color. (Springer Optimization and Its Applications, 38)
978-0-387-88629-9 ▶ 109,95 €

Handbook of Floating-Point Arithmetic

Floating-point arithmetic is by far the most widely used way of implementing real-number arithmetic on modern computers. Although the basic principles of floating-point arithmetic can be explained in a short amount of time, making such an arithmetic reliable and portable, yet fast, is a very difficult task. From the 1960s to the early 1980s, many different arithmetics were developed, but their implementation varied widely from one machine to another, making it difficult for nonexperts to design, learn, and use the required algorithms. As a result, floating-point arithmetic is far from being exploited to its full potential. This handbook aims to provide a complete overview of modern floating-point arithmetic, including a detailed treatment of the newly revised (IEEE 754-2008) standard for floating-point arithmetic. Presented throughout are algorithms for implementing floating-point arithmetic as well as algorithms that use floating-point arithmetic. So that the techniques presented can be put directly into practice in actual coding or design, they are illustrated, whenever possible, by a corresponding program. Key topics and features include: * Presentation of the history and basic concepts of floating-point arithmetic and various aspects of the past and current standards * Development of smart and nontrivial algorithms, and algorithmic possibilities induced by the availability of a fused multiply-add (fma) instruction, e.g., correctly rounded software division and square roots * Implementation of floating-point arithmetic, either in software—an integer processor—or hardware, and a discussion of issues related to compilers and languages * Coverage of several recent advances related to elementary functions: correct rounding of these functions and computation of very accurate approximations under constraints * Extensions of floating-point arithmetic such as certification, verification, and big precision Handbook of Floating-Point Arithmetic is designed for programmers of numerical applications, compiler designers, programmers of floating-point algorithms, designers of arithmetic operators, and more generally, students and researchers in numerical analysis who wish to better understand a tool used in their daily work and research.

More on www.springer.com/978-0-8176-4704-9
Available
2010. XXIV, 572 p. 62 illus.
978-0-8176-4704-9 ▶ 99,95 €
Computational Science and Engineering

Spectral Methods for Uncertainty Quantification
With Applications to Computational Fluid Dynamics

This book presents applications of spectral methods to problems of uncertainty propagation and quantification in model-based computations, focusing on the computational and algorithmic features of these methods most useful in dealing with models based on partial differential equations, in particular models arising in simulations of fluid flows. Spectral stochastic methods are probabilistic in nature, and are consequently rooted in the rich mathematical foundations associated with probability and measure spaces. A brief discussion is provided of only those theoretical aspects needed to set the stage for subsequent applications. These are demonstrated through detailed treatments of elementary problems, as well as in more elaborate examples involving vortex-dominated flows and compressible flows at low Mach numbers. Some recent developments are also outlined in the book, including iterative techniques (such as stochastic formal Killing forms and spinors, and describe Fefferman metrics and recent classification results in Riemannian and Lorentzian signature. In particular, we explain the connection between conformal holonomy and conformal Killing forms and spinors, and describe Fefferman metrics in CR geometry as Lorentzian manifold, discuss its relation to Einstein metrics and recent classification results in Riemanian and Lorentzian signature. In particular, we explain the connection between conformal holonomy and conformal Killing forms and spinors, and describe Fefferman metrics in CR geometry as Lorentzian manifold with conformal holonomy SU(1,m).

Due April 2010
2010. Approx. 300 p. (Scientific Computation, )
978-90-481-3519-6 ➤ approx. 89,95 €

Differential Geometry

Conformal Differential Geometry
Q-Curvature and Conformal Holonomy

Conformal invariants (conformally invariant tensors, conformally covariant differential operators, conformal holonomy groups etc.) are of central significance in differential geometry and physics. Well-known examples of conformally covariant operators are the Yamabe, the Paneitz, the Dirac and the twistor operator. These operators are intimately connected with the notion of Branson’s Q-curvature. The aim of these lectures is to present the basic ideas and some of the recent developments around Q-curvature and conformal holonomy. The part on Q-curvature starts with a discussion of its origins and its relevance in geometry and spectral theory. The following lectures describe the fundamental relation between Q-curvature and scattering theory on asymptotically hyperbolic manifolds. Building on this, they introduce the recent concept of Q-curvature polynomials and use these to reveal the recursive structure of Q-curvatures. The part on conformal holonomy starts with an introduction to Cartan connections and its holonomy groups. Then we define holonomy groups of conformal manifolds, discuss its relation to Einstein metrics and recent classification results in Riemannian and Lorentzian signature. In particular, we explain the connection between conformal holonomy and conformal Killing forms and spinors, and describe Fefferman metrics in CR geometry as Lorentzian manifold with conformal holonomy SU(1,m).

More on www.springer.com/978-3-7643-9908-5
Due January 2010
978-3-7643-9908-5 ➤ 18,00 €

Differential Geometry of Lightlike Submanifolds

This book presents a comprehensive up-to-date research on the latest developments in differential geometry of lightlike (degenerate) subspaces. The main focus is on hypersurfaces and a variety of submanifolds of indefinite Kählerian, Sasakian and quaternion Kähler manifolds. The primary objects of study are non-degenerate screen distributions, Cauchy-Riemann (CR) structures and their interrelated induced vector bundles. The book also contains several recent developments around Q-curvature and conformal holonomy

Due January 2010
2010. Approx. 165 p. (Oberwolfach Seminars, 40)
978-88-7642-348-2 ➤ 18,00 €
More on [www.springer.com/978-1-84882-890-2](http://www.springer.com/978-1-84882-890-2)

Due January 2010

2010. Approx. 490 p. (Frontiers in Mathematics, )
978-3-0346-0250-1 ▶ 59,95 €

### Dynamical Systems and Ergodic Theory

R. Seydel

#### Practical Bifurcation and Stability Analysis

This book covers the central role that bifurcations play in nonlinear phenomena, explaining mechanisms of how stability is gained or lost. It emphasizes practical and computational methods for analyzing dynamical systems. A wide range of phenomena between equilibrium and chaos is explained and illustrated by examples from science and engineering. The book is a practical guide for performing parameter studies and includes exercises. Combining an introduction on the textbook level with an exposition of computational methods, this book addresses the mathematical needs of scientists and engineers. It should be of interest to those in a wide variety of disciplines, including physics, mechanical engineering, electrical engineering, chemistry and chemical engineering, biology, and medicine. Both graduate students (in courses on dynamical systems, stability analysis, differential equations, and chaos) and professionals will be able to use the book equally well. The introduction avoids mathematical formalism, and the only required background is calculus. In the third edition there is a chapter on applications and extensions of standard ODE approaches, for example, to delay equations, to differential-algebraic equations, and to reaction-diffusion problems. Additional material is inserted, including the topics deterministic risk, pattern formation, and control of chaos, and many further references. Review of Earlier Edition: "The outcome is impressive. The book is beautifully written in a style that seeks not only to develop the subject matter but also to expose the thought processes behind the mathematics." Proceedings of the Edinburgh Mathematical Society


Due May 2010

2010. Approx. 455 p. (Universitext, )
978-0-387-70913-0 ▶ approx. 44,45 €

### Functional Analysis

H. Brézis

#### Functional Analysis, Sobolev Spaces and Partial Differential Equations

This textbook is a completely revised, updated, and expanded English edition of the important Analyse fonctionnelle (1983). In addition, it contains a wealth of problems and exercises (with solutions) to guide the reader. Uniquely, this book presents in a coherent, concise and unified way the main results from functional analysis together with the main results from the theory of partial differential equations (PDEs). Although there are many books on functional analysis and many on PDEs, this is the first to cover both of these closely connected topics. Since the French book was first published, it has been translated into Spanish, Italian, Japanese, Korean, Romanian, Greek and Chinese. The English edition makes a welcome addition to this list.


Due February 2010

2010. XVIII, 483 p. 200 illus. (Interdisciplinary Applied Mathematics, 5)
978-1-4419-1739-3 ▶ 69,95 €

### The Mathematics of Medical Imaging

T.G. Feeman

#### A Beginner’s Guide

A Beginner’s Guide to the Mathematics of Medical Imaging presents the basic mathematics of computerized tomography – the CT scan – for an audience of undergraduates in mathematics and engineering. Assuming no prior background in advanced mathematical analysis, topics such as the Fourier transform, sampling, and discrete approximation algorithms are introduced from scratch and are developed within the context of medical imaging. A chapter on magnetic resonance imaging focuses on manipulation of the Bloch equation, the system of differential equations that is the foundation of this important technology. The text is self-contained with a range of practical exercises, topics for further study, and an ample bibliography, making it ideal for use in an undergraduate course in applied or engineering mathematics, or
by practitioners in radiology who want to know more about the mathematical foundations of their field.

More on www.springer.com/978-0-387-92711-4
Due January 2010
2010. X, 141 p. 20 illus. (Springer Undergraduate Texts in Mathematics and Technology, )
978-0-387-92711-4 ► 39,95 €

Forthcoming
S. Fournais, B. Helffer
Spectral Methods in Surface Superconductivity
In the past decade, the mathematics of superconductivity has been the subject of intense study. This book examines in detail the nonlinear Ginzburg-Landau functional, the model most commonly used. Specifically, cases in the presence of a strong magnetic field and with a sufficiently large Ginzburg-Landau parameter kappa are covered. Key topics and features: * Provides a concrete introduction to techniques in spectral theory and Partial Differential Equations * Offers a complete analysis of the two-dimensional Ginzburg-Landau functional with large kappa in the presence of a magnetic field * Treats the three-dimensional case thoroughly * Includes open problems Spectral Methods in Surface Superconductivity is intended for students and researchers with a graduate level understanding of functional analysis, spectral theory, and the analysis of partial differential equations. The book also includes an overview of all nonstandard material as well as important semiclassical techniques in spectral theory that are involved in the nonlinear study of superconductivity.

More on www.springer.com/978-0-8176-4796-4
Due March 2010
978-0-8176-4796-4 ► approx. 61,60 €

Geometry Revealed
A Jacob’s Ladder to Modern Higher Geometry
Both classical geometry and modern differential geometry have been active subjects of research throughout the 20th century and lie at the heart of many recent advances in mathematics and physics. The underlying motivating concept for the present book is that it offers readers the elements of a modern geometric culture by means of a whole series of visually appealing unsolved (or recently solved) problems that require the creation of concepts and tools of varying abstraction. Starting with such natural, classical objects as lines, planes, circles, spheres, polygons, polyhedra, curves, surfaces, convex sets, etc., crucial ideas and above all abstract concepts needed for attaining the results are elucidated. These are conceptual notions, each built “above” the preceding and permitting an increase in abstraction, represented metaphorically by Jacob’s ladder with its rungs: the ‘ladder’ in the Old Testament, that angels ascended and descended... In all this, the aim of the book is to demonstrate to readers the unceasingly renewed spirit of geometry and that even so-called “elementary” geometry is very much alive and at the very heart of the work of numerous contemporary mathematicians. It is also shown that there are innumerable paths yet to be explored and concepts to be created. The book is visually rich and inviting, so that readers may open it at random places and find much pleasure throughout according their own inclinations. Marcel Berger is the author of numerous successful books on geometry, this book once again is addressed to all students and teachers of mathematics with an affinity for geometry.

More on www.springer.com/978-3-540-70996-1
Due January 2010
2010. XII, 860 p.
978-3-540-70996-1 ► 59,95 €

Forthcoming
U.H. Kortenkamp, J. Richter-Gebert
The Cinderella.2 Manual
Cinderella.2, the new version of the well-known interactive geometry software, has become an even more versatile tool than its predecessor. The geometry component extends the functionality to such spectacular objects as dynamic fractals, and the software includes two major new components: physical simulation such as of mechanical objects, virtual electronic devices, and electromagnetic properties. Cinderella.2 Documentation is the first book to offer complete instruction and techniques for using Cinderella.2, including the new components feature algorithms via a specially developed scripting language, which interacts smoothly with the geometry and physics components. Cinderella.2 is Math in Motion all the way, and this book provides comprehensive documentation from start to finish.

More on www.springer.com/978-3-540-34924-2
Due February 2010
2010.
978-3-540-34924-2 ► 24,95 €

Global Analysis and Analysis on Manifolds

The Geometry of Filtering
The geometry which is the topic of this book is that determined by a map of one space N onto another, M, mapping a diffusion process, or operator, on N to

Based on a series of lectures the author prepared for adult students at Reading University in the UK, this lively and entertaining book proves that, far from being a dusty, dull subject, geometry is in fact full of beauty and fascination. The author’s infectious enthusiasm is put to use in explaining many of the key concepts in the field, starting with the Golden Number and taking the reader on a geometrical journey via Shapes and Solids, Circles and Spheres, Projective Geometry and Topology, into and out of the Fourth Dimension, and finishing up with Einstein’s Theories of Relativity. Aimed at a general readership, and requiring only a basic understanding of mathematics, the text uses examples such as soap bubbles to make accessible complex subjects such as Chaos and Fractals, Steiner’s porism and Soddy’s Hexlet. It includes a wealth of the author’s own diagrams and illustrations, of which several are in stereo. As well as material based on the lectures themselves, including sets of exercises, the book features a number of appendices that cover related topics and provide further reading and information. Equally ideal as an educational gift for a youngster or as a nostalgic journey back into the world of mathematics for older readers, John Barnes’ book is the perfect antidote for anyone whose maths lessons at school are a source of painful memories. Where once geometry was a source of confusion and frustration, Barnes brings enlightenment and entertainment.

More on www.springer.com/978-3-642-05091-6
Due January 2010
2010. XII, 336 p.
978-3-642-05091-6 ► 39,95 €
one on M. Filtering theory is the science of obtaining or estimating information about a system from partial and possibly flawed observations of it. The system itself may be random, and the flaws in the observations can be caused by additional noise. In this volume the randomness and noises will be of Gaussian white noise type so that the system can be modelled by a diffusion process; that is it evolves continuously in time in a Markovian way, the future evolution depending only on the present situation. This is the standard situation of systems governed by Itô type stochastic differential equations. The state space will be the smooth manifold, N, possibly infinite dimensional, and the “observations” will be obtained by a smooth map onto another manifold, N, say. We emphasise that the geometry is important even when both manifolds are Euclidean spaces. This can also be viewed from a purely partial differential equations viewpoint as one smooth second order elliptic partial differential operator lying above another, both with no zero order term. We consider the geometry of this situation with special emphasis on situations of geometric, stochastic analytic, or filtering interest. The most well studied case is of one Brownian motion being mapped to another with a consequent skew product decomposition (or equivalently the case of Riemannian submersions). This sort of decomposition is generalised and a key to the rest of the book. It is used to study in particular, classical filtering, (semi-)connections determined by stochastic flows, and generalised Wiener-Bochn formulae.

More on www.springer.com/978-3-0346-0175-7
Due February 2010
2010. Approx. 170 p. (Frontiers in Mathematics,
978-3-0346-0175-7 ▶ 29,95 €

Applications of Teichmüller Theory to 3-Manifolds
This book contains a modern treatment of the Weil-Petersson geometry of Teichmüller space and an exposition of some recent results on the volume of convex cores of hyperbolic 3-manifolds. It also contains a complete proof of the ending lamination conjecture for hyperbolic 3-manifolds which are diffeomorphic to the product of a surface with the real line and whose injectivity radius is bounded from below.

More on www.springer.com/978-3-7643-8792-1
Due March 2010
2010. Approx. 200 p. (Oberwolfach Seminars, 41)
978-3-7643-8792-1 ▶ 39,95 €

Group Theory and Generalizations
Forthcoming
M. Broué

Introduction to Complex Reflection Groups and Their Braid Groups
Weyl groups are particular cases of complex reflection groups, i.e. finite subgroups of GL(r,C) generated by (pseudo)reflections. These are groups whose polynomial ring of invariants is a polynomial algebra. It has recently been discovered that complex reflection groups play a key role in the theory of finite reducible groups, giving rise as they do to braid groups and generalised Hecke algebras which govern the representation theory of finite reducible groups. It is now also broadly agreed upon that many of the known properties of Weyl groups can be generalized to complex reflection groups. The purpose of this work is to present a fairly extensive treatment of many basic properties of complex reflection groups (characterization, Steinberg theorem, Gutkin-Oppam matrices, Solomon theorem and applications, etc.) including the basic findings of Springer theory on eigenspaces. In doing so, we also introduce basic definitions and properties of the associated braid groups, as well as a quick introduction to Bessis’ lifting of Springer theory to braid groups.

More on www.springer.com/978-3-642-11174-7
Due February 2010
978-3-642-11174-7 ▶ 34,95 €

History of Mathematics

History of Mathematics

History of Mathematics

Japanese Mathematics in the Edo Period (1600-1868)
A study of the works of Seki Takakazu (?-1708) and Takebe Katahiro (1664-1739)
Japanese mathematics, known also under the name of wasan, experienced a remarkable development between the seventeenth and nineteenth centuries. Wasan took its roots from the Chinese tradition of mathematics and shared its language and its categories of problems, but gave it a new impetus, transforming the Chinese algebraic method of the “heavenly element” into a powerful tool with a much wider scope. All domains of mathematical research were revisited in the light of this new algebra. This book focuses on the first period of the development of wasan. It offers a survey of the earliest manuals of learning the use of the abacus published in the seventeenth century, notably the famous Jinkoki, which counted among the bestsellers of the Tokugawa period. The works of the two greatest mathematicians of this period, Seki Takakazu and Takebe Katahiro, and the way they transformed the face of mathematics, are examined in detail, with particular emphasis on the historical context, the relations between these two mathematicians and the political leaders of the epoch, and the role that mathematics played in this rapidly rising society.

More on www.springer.com/978-3-7643-8744-0
Due March 2010
978-3-7643-8744-0 ▶ 199,00 €

David Hilbert’s Notebooks and General Foundational Lectures
Volume 6 contains a selection of material exhibiting many of Hilbert’s philosophical and foundational views on particular theories and the exact sciences in general, drawn from his private notebooks and from lectures for more general audiences held in the 1920s.

More on www.springer.com/978-3-540-20579-1
Due May 2010
978-3-540-20579-1 ▶ approx. 89,95 €

Louis Couturat -Traité de Logique Algébrique
The manuscript of the Traité de Logique algorithmique resulted from lectures Couturat gave at the University of Caen in 1898/99 on recent developments in symbolic logic, on the relations of logic and mathematics, and on the scope of the methods of
mathematics. It is the only one of several manuscripts Cœturrat mentioned in his correspondence that meanwhile has been rediscovered. It is an outstanding document of the popularization and propagation of symbolic logic around 1900. It allows to better understand the difficult relations of algebraic logic and the so-called logistic program which surpasses today's simple alternative of logic as an application of algebra vs. logic as the foundation of mathematics. The complicated interactions in the historical developments of these two currents become manifest in Couturat's hesitations and changing attitudes within his own intellectual biography. The publication of this manuscript helps to achieve a much more complete picture of the latter.

More on www.springer.com/978-3-0346-0410-9

Due May 2010

2010. (Publications des Archives Henri Poincaré / Publications of the Henri Poincaré Archives, )
978-3-0346-0410-9 ▶ 89,95 €

Pappus of Alexandria: Book 4 of the Collection

Edited With Translation and Commentary by Heike Sefrin-Weis

Although not so well known today, Book 4 of Pappus’ Collection is one of the most important and influential mathematical texts from antiquity, both because of its content and because of its impact on early modern mathematics after 1600. As a kind of textbook in anthology format, the mathematical vignettes form a portrait of mathematics during the Hellenistic “Golden Age”, illustrating central problems – for example, it discusses all three of the famous ancient problems in geometry: squaring the circle; doubling the cube; and trisecting an angle – varying solution strategies, and the different mathematical styles within ancient geometry. This volume provides an English translation of Collection 4, in full, for the first time, including: a new edition of the Greek text, based on a fresh transcription from the main manuscript and offering an alternative to Hultsch's standard edition; notes to facilitate understanding of the steps in the mathematical argument; a commentary highlighting aspects of the work that have so far been neglected, and supporting the reconstruction of a coherent plan and vision within the work; bibliographical references for further study. Historians of mathematics will find it useful for scholarly work on ancient geometry and its reception in the early modern era and it will also serve as a source book for exemplary arguments in ancient geometry. Pappus himself probably intended Collection 4 to be an introductory survey of the classical geometrical tradition – from the point of view of mathematical methods and strategies – for readers that had a basic training in elementary geometry (Elements I – VI). Likewise, this edition can be used as a textbook in advanced undergraduate and graduate courses on the history of ancient geometry.


Due January 2010

2010. 247 p. 101 illus. (Sources and Studies in the History of Mathematics and Physical Sciences, )
978-1-84996-004-5 ▶ 89,95 €
work on active channels, all equations are linear and in theory completely solvable in closed form.
Due March 2010
978-0-387-87707-5 ▶ approx. 51,85 €

body of mathematical research in the present and near future.
Due February 2010
2010. Approx. 470 p. (Modern Birkhäuser Classics, )
978-3-0346-0421-5 ▶ 44,95 €

Forthcoming

N. Crato

Figuring It Out
Entertaining Encounters with Everyday Math
This is a book of mathematical stories — funny and puzzling mathematical stories. They tell of villains who try to steal secrets, heroes who encode their messages, and mathematicians who spend years on end searching for the best way to pile oranges. There are also stories about highway confusions occurring when the rules of Cartesian geometry are ignored, small change errors due to ignorance of ancient paradoxes, and mistakes in calendars arising from poor numerical approximations. This book is about the power and beauty of mathematics. It shows mathematics in action, explained in a way that everybody can understand. It is a book for enticing youngsters and inspiring teachers. Nuno Crato is a leading science writer and mathematician, whose entertaining essays have won a number of international awards.
More on www.springer.com/978-3-642-04832-6
Due April 2010
978-3-642-04832-6 ▶ 27,95 €

Forthcoming

G.B. Ermentrout, D. Terman

Foundations of Mathematical Neuroscience
This book is motivated by a perceived need for an overview of how dynamical systems and computational analysis have been used in understanding the types of models that come out of neuroscience. The book arose out of several courses that the authors have taught including a graduate course in computational neuroscience with students from psychology, mathematics, computer science, physics and neuroscience backgrounds. The book begins with biophysics of the cell membrane and from this introduces compartmental models, continuum limits and cable theory and active ion channels. Prior to the mathematical research in the present and near future.
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fast algorithms, operator theory, and applications to system theory and signal processing.

More on www.springer.com/978-3-7643-8995-6

Due February 2010
978-3-7643-8995-6  ► 149,00 €

Forthcoming
E. Hairer, C. Lubich, G. Wanner

Geometric Numerical Integration
Structure-Preserving Algorithms for Ordinary Differential Equations

Numerical methods that preserve properties of Hamiltonian systems, reversible systems, differential equations on manifolds and problems with highly oscillatory solutions are the subject of this book. A complete self-contained theory of symplectic and symmetric methods, which include Runge-Kutta, composition, splitting, multistep and various specially designed integrators, is presented and their construction and practical merits are discussed. The long-time behaviour of the numerical solutions is studied using a backward error analysis (modified equations) combined with KAM theory. The book is illustrated by many figures, it treats applications from physics and astronomy and contains many numerical experiments and comparisons of different approaches. The second edition is substantially revised and enlarged, with many improvements in the presentation and additions concerning in particular non-canonical Hamiltonian systems, highly oscillatory mechanical systems, and the dynamics of multistep methods.

More on www.springer.com/978-3-642-05157-9

Due February 2010
2010. XVI, 614 p. (Springer Series in Computational Mathematics, 14)
978-3-642-05220-0  ► approx. 64,95 €

Operations Research, Mathematical Programming

Forthcoming
R.I. Bot

Conjugate Duality in Convex Optimization

This book presents new achievements and results in the theory of conjugate duality for convex optimization problems. The perturbation approach for attaching a dual problem to a primal one makes the object of a preliminary chapter, where also an overview of the classical generalized interior point regularity conditions is given. A central role in the book is played by the formulation of generalized Moreau-Rockafellar formulae and closedness-type conditions, the latter constituting a new class of regularity conditions, in many situations with a wider applicability than the generalized interior point ones. The reader also receives deep insights into biconjugate calculus for convex functions, the relations between different existing strong duality notions, but also into several unconventional Fenchel duality topics. The final part of the book is consecrated to the applications of the convex duality theory in the field of monotone operators.

More on www.springer.com/978-3-642-04899-9

Due January 2010
978-3-642-04899-9  ► 69,95 €

Operator Theory

Forthcoming
S. Axler, P. Rosenthal, D. Sarason

A Glimpse at Hilbert Space Operators

Paul R. Halmos in Memoriam

The book is a commemorative volume honoring the mathematician Paul R. Halmos (1916-2006), who contributed passionately to mathematics in manifold ways, among them by basic research, by unparalleled mathematical exposition, by unselfish service to the mathematical community, and, not least, by the inspiration others found in his dedication to that community. Halmos made fundamental contributions in several areas of mathematics. This volume emphasizes Halmos’s contributions to operator theory, his venue for most of his mathematical life. The core of the volume is a series of expository articles by prominent operator theorists providing an overview of how operator theory prospered during the Halmos era, in no small measure thanks to Halmos’s leadership and penetrating insights.

More on www.springer.com/978-3-0346-0346-1

Due April 2010
978-3-0346-0346-1  ► 129,00 €

Solving Ordinary Differential Equations II

Stiff and Differential-Algebraic Problems

The subject of this book is the solution of stiff differential equations and of differential-algebraic systems (differential equations with constraints). There is a chapter on one-step and extrapolation methods for stiff problems, another on multistep methods and general linear methods for stiff problems, a third on the treatment of singular perturbation problems, and a last one on differential-algebraic problems with applications to constrained mechanical systems. The beginning of each chapter is of introductory nature, followed by practical applications, the discussion of numerical results, theoretical investigations on the order and accuracy, linear and nonlinear stability, convergence and asymptotic expansions. Stiff and differential-algebraic problems arise everywhere in scientific computations (e.g. in physics, chemistry, biology, control engineering, electrical network analysis, mechanical systems). Many applications as well as computer programs are presented. Ernst Hairer and Gerhard Wanner were jointly awarded the 2003 Peter Henrici Prize at ICIAM 2003 in Sydney, Australia.

More on www.springer.com/978-3-642-05220-0

Due February 2010
2010. XVI, 614 p. (Springer Series in Computational Mathematics, 14)
978-3-642-05220-0  ► approx. 64,95 €

Dynamics of Information Systems

Theory and Applications

"Dynamics of Information Systems" presents state-of-the-art research explaining the importance of information in the evolution of a distributed or networked system. This book presents techniques for measuring the value or significance of information within the context of a system. Each chapter reveals a unique topic or perspective from experts in this exciting area of research. These newly developed techniques have numerous applications including: the detection of terrorist networks, the design of highly function-
A State Space Approach to Canonical Factorization with Applications

The present book deals with canonical factorization of matrix and operator functions that appear in state space form or that can be transformed into such a form. A unified geometric approach is used. The main results are all expressed explicitly in terms of matrices or operators, which are parameters of the state space representation. The applications concern different classes of convolution equations. The analysis of canonical factorization for functions with symmetries, including spectral and J-spectral factorizations, related Riccati equations, and elements of H-infinity control theory are also main topics. This is the second book written by the four authors in which the state space factorization method is systematically used and developed further. In their first book, released in 2007, the emphasis is on non-canonical factorizations and degree one factorizations, in particular. The present book concentrates on canonical factorization and its applications. Together both books present a rich and far reaching update of the 1979 monograph, and its applications. Together both books present a rich and far reaching update of the 1979 monograph, and its applications.

M.A. Gosson

Bopp Pseudo-Differential Operators and Deformation Quantization

"Deformation quantization" is a mathematical theory which provides an alternative approach to quantum mechanics. It has ramifications in both pure mathematics and physics. This book gives a novel approach to the subject by using pseudo-differential methods ("Bopp quantization") where the theory of modulation spaces plays a central role.

M.A. Gosson

Convergence and Singular Integral Equations

This volume contains English translations of 13 groundbreaking papers on Toeplitz matrices and Wiener-Hopf equations and other classes of discrete and continuous convolution operators and singular integral equations. The papers are both of theoretical and numerical interest. In particular, the papers examine fast algorithms for inversion of these operators, the theory of discrete and continuous resultants, inversion via factorization, and symbol construction. Originally the papers were written in Russian more than thirty years ago; their English translation is published here for the first time. These papers solved difficult problems and opened new venues in the above-mentioned areas. They are still frequently quoted, and moreover, they exert a continuing influence on numerical analysis and other areas of Pure and Applied Mathematics and Engineering. The book is addressed to a wide audience of mathematicians and engineers, from graduate students to researchers, whose interests lie in the above-mentioned areas.

L. Lerer, V. Olshevsky, I.M. Spitkovsky

Stability of Operators and Operator Semigroups

The asymptotic behaviour, in particular "stability" in some sense, is studied systematically for discrete and for continuous linear dynamical systems on Banach spaces. Of particular concern is convergence to an equilibrium with respect to various topologies. Parallel results and differences between the discrete and the continuous situation are emphasised.

O. Guler

Foundations of Optimization in Finite Dimensions

This book is intended as a textbook to be used in a first graduate level course, and covers the fundamental principals of optimization in finite dimensions. It develops the necessary background material in multivariable calculus using coordinates as well as in a coordinate-free manner, so that the recent developments such as semidefinite programming can be dealt with ease. All the standard topics of mathematical programming, such as necessary and sufficient optimality conditions for optimality, convex analysis and duality, are covered in great detail, often from multiple points of view. A distinctive feature of this book is its set of worked-out examples and problems, including hundreds of well-chosen problems and important examples.
Order, Lattices, Ordered Algebraic Structures

This book provides an exposition of the algebraic aspects of the theory of lattice-ordered rings and lattice-ordered modules. All of the background material on rings, modules, and lattice-ordered groups necessary to make the work self-contained and accessible to a variety of readers is included. Steinberg includes in his presentation of the material 800+ extensive exercises of varying levels of difficulty at the end of each of the sections. The first two chapters of the book provide a thorough introduction to the material, while the following four chapters delve into more specific topics. Key topics include: * lattice-ordered groups, rings, and fields; * archimedean $\ell$-groups; * $f$-rings and larger varieties of $\ell$-rings; * the category of $f$-modules; * various commutativity results. Filling a gap in the literature, Lattice-Ordered Rings and Modules may be used as a textbook or for self-study by graduate students and researchers studying lattice-ordered rings and lattice-ordered modules.

More on www.springer.com/978-1-4419-5541-8

Due January 2010

2010. Approx. 280 p. (Springer Monographs in Mathematics, )
978-1-4419-5541-8 ▶ 79,95 €

Global Pseudo-differential Calculus on Euclidean Spaces

The book presents a global pseudo-differential calculus in Euclidean spaces, which includes SG as well as Shubin classes and their natural generalizations containing Schroedinger operators with non-polynomial potentials. This calculus is applied to study global hypoellipticity for several pseudo-differential operators, spectral properties and complex powers of hypoelliptic operators, Schatten-von Neumann classes, the Connes-Wodicki residue in Euclidean spaces, exponential decay of eigenfunctions, regularity and decay of homoclinics for semilinear equations and travelling waves. The book is completely self-contained and accessible to graduate students.

More on www.springer.com/978-3-7643-8511-8

Due April 2010

978-3-7643-8511-8 ▶ approx. 49,95 €

Partial Differential Equations

Forthcoming

V. Barbu

Nonlinear Differential Equations of Monotone Types in Banach Spaces

This book is concerned with basic results on problems associated with nonlinear monotone operators in spaces with applications to partial differential equations of evolution type. This is a monograph about the most significant results obtained in this area in last decades but is also written as a graduate textbook on modern methods in partial differential equations with main emphasis on applications to fundamental mathematical models of mathematical physics, fluid dynamics and mechanics. This book is self-contained while the pre-

More on www.springer.com/978-1-4419-5541-8

Due February 2010

2010. Approx. 280 p. (Springer Monographs in Mathematics, )
978-1-4419-5541-8 ▶ 79,95 €

Probability Theory and Stochastic Processes

S.N. Ethier

The Doctrine of Chances

Probabilistic Aspects of Gambling

Three centuries ago Montmort and De Moivre published two of the first books on probability theory, then called the doctrine of chances, emphasizing its most important application at that time, games of chance. This book, on the probabilistic aspects of gambling, is a modern version of those classics. While covering the classical material such as house advantage and gambler’s ruin, it also takes up such 20th-century topics as martingales, Markov chains, game theory, bold play, and optimal proportional play. In addition there is extensive coverage of specific casino games such as roulette, craps, video poker, baccarat, and twenty-one.

More on www.springer.com/978-3-540-78782-2

Due February 2010

978-3-540-78782-2 ▶ 79,95 €

Stochastic Partial Differential Equations

A Modeling, White Noise Functional Approach

The first edition of Stochastic Partial Differential Equations: A Modeling, White Noise Functional Approach, gave a comprehensive introduction to SPDEs driven by space-time Brownian motion noise. In this, the second edition, the authors extend the theory to include SPDEs driven by space-time Lévy process noise, and introduce new applications of the field. Because the authors allow the noise to be in both space and time, the solutions to SPDEs are usually of the distribution type, rather than a classical random
A New Perspective on Thermodynamics

Dr. Bernard H. Lavenda has written A New Perspective on Thermodynamics to combine an old look at thermodynamics with a new foundation. The book presents a historical perspective, which unravels the current presentation of thermodynamics found in standard texts, and which emphasizes the fundamental role that Carnot played in the development of thermodynamics. A New Perspective on Thermodynamics will: Chronologically unravel the development of the principles of thermodynamics and how they were conceived by their discoverers Bring the theory of thermodynamics up to the present time and indicate areas of further development with the union of information theory and the theory of means and their inequalities. New areas include nonextensive thermodynamics, the thermodynamics of coding theory, multifractals, and strange attractors. Reinroduce important, yet nearly forgotten, teachings of N.L. Sardi Carnot Highlight conceptual flaws in timely topics such as endoreversible engines, finite-time thermodynamics, geometrization of thermodynamics, and nonequilibrium work from equilibrium free energy differences. Dr. Bernard H. Lavenda is Professor of Physical Chemistry at Universita degli Studi di Camerino, Italy. He is recipient of the 2009 Telesio-Galilei Prize in Physics for his work on irreversible thermodynamics.

Due January 2010
2010. XX, 207 p. 21 illus.
978-1-4419-1429-3 ▶ 99,95 €

Probability Inequalities

Inequality has become an essential tool in many areas of mathematical research, for example in probability and statistics where it is frequently used in the proofs. "Probability Inequalities" covers inequalities related with events, distribution functions, characteristic functions, moments and random variables (elements) and their sum. The book shall serve as a useful tool and reference for scientists in the areas of probability and statistics, and applied mathematics. Prof. Zhengyan Lin is a fellow of the Institute of Mathematical Statistics and currently a professor at Zhejiang University, Hangzhou, China. He is the prize winner of National Natural Science Award of China in 1997. Prof. Zhidong Bai is a fellow of TWAS and the Institute of Mathematical Statistics; he is a professor at the National University of Singapore and Northeast Normal University, Changchun, China.

More on www.springer.com/978-1-4419-1604-4
Due January 2010
978-1-4419-1604-4 ▶ 59,95 €

Forthcoming

Z. Schuss

Theory and Applications of Stochastic Processes
An Analytical Approach

This book offers an analytical approach to stochastic processes that are most common in the physical and life sciences. Its aim is to make probability theory readily accessible to scientists trained in the traditional methods of applied mathematics, such as integral, ordinary, and partial differential equations and in asymptotic methods, rather than in probability and measure theory. It shows how to derive explicit expressions for quantities of interest by solving equations. Emphasis is put on rational modeling and approximation methods. The book includes many detailed illustrations, applications, examples and exercises. It will appeal to graduate students and researchers in mathematics, physics and engineering.

More on www.springer.com/978-1-4419-1620-3
Due January 2010
2010. Approx. 754 p. (Springer Finance, 97)
978-1-4419-1620-3 ▶ 79,95 €

Forthcoming

E. Ohlsson, B. Johansson

Non-Life Insurance Pricing with Generalized Linear Models

Non-life insurance pricing is the art of setting the price of an insurance policy, taking into consideration various properties of the insured object and the policy holder. Introduced by British actuaries generalized linear models (GLMs) have become today the standard approach for tariff analysis. The book focuses on methods based on GLMs that have been found useful.
in actuarial practice and provides a set of tools for a tariff analysis. Basic theory of GLMs in a tariff analysis setting is presented with useful extensions of standard GLM theory that are not in common use. The book meets the European Core Syllabus for actuarial education and is written for actuarial students as well as practicing actuaries. To support reader real data of some complexity are provided at www.math.su.se/GLMbook.

More on www.springer.com/978-3-642-10790-0
Due February 2010

- 2010. Approx. 190 p. (EAA Lecture Notes, )
- 978-3-642-10790-0  ➤ approx. 39,95 €

Special Functions

Hypergeometric Orthogonal Polynomials and their q-analogues

The very classical orthogonal polynomials named after Hermite, Laguerre and Jacobi, satisfy many common properties. For instance, they satisfy a second-order differential equation with polynomial coefficients and can be expressed in terms of a hypergeometric function. Replacing the differential equation by a second-order difference equation results in (discrete) orthogonal polynomial solutions with similar properties. Generalizations of these difference equations, in terms of Hahn’s q-difference operator, lead to both continuous and discrete orthogonal polynomials with similar properties. For instance, they can be expressed in terms of (basic) hypergeometric functions. Based on Favard’s theorem, the authors first classify all families of orthogonal polynomials satisfying a second-order differential or difference equation with polynomial coefficients. Together with the concept of duality this leads to the families of hypergeometric orthogonal polynomials belonging to the Askey scheme. For each family they list the most important properties and they indicate the (limit) relations. Furthermore the authors classify all q-orthogonal polynomials satisfying a second-order q-difference equation based on Hahn’s q-operator. Together with the concept of duality this leads to the families of basic hypergeometric orthogonal polynomials which can be arranged in a q-analogue of the Askey scheme. Again, for each family they list the most important properties, the (limit) relations between the various families and the limit relations (for q → 1) to the classical hypergeometric orthogonal polynomials belonging to the Askey scheme. These (basic) hypergeometric orthogonal polynomials have several applications in various areas of mathematics and (quantum) physics such as approximation theory, asymptotics, birth and death processes, probability and statistics, coding theory and combinatorics.

More on www.springer.com/978-3-642-05013-8
Due March 2010

- 2010. Approx. 570 p. (Springer Monographs in Mathematics, )
- 978-3-642-05013-8  ➤ 99,95 €

Statistical Theory and Methods

Forthcoming

Z. Bai, J.W. Silverstein

Spectral Analysis of Large Dimensional Random Matrices

The aim of the book is to introduce basic concepts, main results, and widely applied mathematical tools in the spectral analysis of large dimensional random matrices. The core of the book focuses on results established under moment conditions on random variables using probabilistic methods, and is thus easily applicable to statistics and other areas of science. The book introduces fundamental results, most of them investigated by the authors, such as the semicircular law of Wigner matrices, the Marchenko-Pastur law, the limiting spectral distribution of the multivariate F matrix, limits of extreme eigenvalues, spectrum separation theorems, convergence rates of empirical distributions, central limit theorems of linear spectral statistics, and the partial solution of the famous circular law. While deriving the main results, the book simultaneously emphasizes the ideas and methodologies of the fundamental mathematical tools, among them being: truncation techniques, matrix identities, moment convergence theorems, and the Stieltjes transform. Its treatment is especially fitting to the needs of mathematics and statistics graduate students and beginning researchers, having a basic knowledge of matrix theory and an understanding of probability theory at the graduate level, who desire to learn the concepts and tools in solving problems in this area. It can also serve as a detailed handbook on results of large dimensional random matrices for practical users. This second edition includes two additional chapters, one on the authors’ results on the limiting behavior of eigenvectors of sample covariance matrices, another on applications to wireless communications and finance. While attempting to bring this edition up-to-date on recent work, it also provides summaries of other areas which are typically considered part of the general field of random matrix theory. Zhidong Bai is a professor of the School of Mathematics and Statistics at Northeast Normal University and Department of Statistics and Applied Probability at National University of Singapore. He is a Fellow of the Third World Academy of Sciences and a Fellow of the Institute of Mathematical Statistics. Jack W. Silverstein is a professor in the Department of Mathematics at North Carolina State University. He is a Fellow of the Institute of Mathematical Statistics.

More on www.springer.com/978-1-4419-0660-1
Due February 2010

- 978-1-4419-0660-1  ➤ 89,95 €

Frontiers in Statistical Quality Control 9

The twenty-three papers in this volume are carefully selected, reviewed and revised for this volume, and are divided into two parts: Part 1: “On-line Control” with subchapters 1.1 "Control Charts" and 1.2 "Surveillance Sampling and Sampling Plans" and Part 2: "Off-line Control".

More on www.springer.com/978-3-7908-2379-0
Due February 2010

- 978-3-7908-2379-0  ➤ 79,95 €

Advances in Degradation Modeling

Applications to Reliability, Survival Analysis, and Finance

This volume—dedicated to William Q. Meeker on the occasion of his sixtieth birthday—is a collection of invited chapters covering recent advances in accelerated life testing and degradation models. The book covers a wide range of applications to areas such as reliability, quality control, the health sciences, economics, and finance. Specific topics covered include:

- Accelerated testing and inference
- Nonparametric inference
- Model validity in accelerated testing
- The point process approach
- Bootstrap methods in degradation analysis
Analyzing the data using PROC IML and then performing mixed model estimation (REML). The example demonstrates using restricted maximum likelihood (REML) in the book for a basic analysis of a linear mixed model, which is an example of a special topics course. Also included for side-by-side comparison. The book contains complete examples of SAS code for many of the computations relevant to a linear models course. However, the SAS code in these examples automates the analytic formulas. The code for high-level procedures like PROC MIXED can be typed directly into PROC IML, as they were presented in the linear models course, and solved using data. This helps students see the link between theory and application. This also assists researchers in developing new methodologies in the area of linear models. The book contains complete examples of SAS code for many of the computations relevant to a linear models course. However, the SAS code in these examples automates the analytic formulas. The code for high-level procedures like PROC MIXED is also included for side-by-side comparison. The book computes basic descriptive statistics, matrix algebra, matrix decomposition, likelihood maximization, nonlinear optimization, etc. in a format conducive to a linear models or special topics course. Also included in the book is an example of a basic analysis of a linear mixed model using restricted maximum likelihood estimation (REML). The example demonstrates tests for fixed effects, estimates of linear functions, and contrasts. The example starts by showing the steps for analyzing the data using PROC IML and then provides the analysis using PROC MIXED. This allows students to follow the process that lead to the output. More on [www.springer.com/978-1-4419-5556-2](http://www.springer.com/978-1-4419-5556-2)

Due January 2010

2010. XXVIII, 416 p. (Statistics for Industry and Technology.)
978-0-8176-4923-4 ▶ 109.95 €

**A SAS/IML Companion for Linear Models**

Linear models courses are often presented as either theoretical or applied. Consequently, students may find themselves either proving theorems or using high-level procedures like PROC GLM to analyze data. There exists a gap between the derivation of formulas and analyses that hide these formulas behind attractive user interfaces. This book bridges that gap, demonstrating theory put into practice. Concepts presented in a theoretical linear models course are often trivialized in applied linear models courses by the facility of high-level SAS procedures like PROC MIXED and PROC REG that require the user to provide a few options and statements and in return produce vast amounts of output. This book uses PROC IML to show how analytic linear models formulas can be typed directly into PROC IML, as they were presented in the linear models course, and solved using data. This helps students see the link between theory and application. This also assists researchers in developing new methodologies in the area of linear models. The book contains complete examples of SAS code for many of the computations relevant to a linear models course. However, the SAS code in these examples automates the analytic formulas. The code for high-level procedures like PROC MIXED is also included for side-by-side comparison. The book computes basic descriptive statistics, matrix algebra, matrix decomposition, likelihood maximization, nonlinear optimization, etc. in a format conducive to a linear models or a special topics course. Also included in the book is an example of a basic analysis of a linear mixed model using restricted maximum likelihood estimation (REML). The example demonstrates tests for fixed effects, estimates of linear functions, and contrasts. The example starts by showing the steps for analyzing the data using PROC IML and then provides the analysis using PROC MIXED. This allows students to follow the process that lead to the output. More on [www.springer.com/978-1-4419-5556-2](http://www.springer.com/978-1-4419-5556-2)

Due January 2010

2010. XXVIII, 416 p. (Statistics for Industry and Technology.)
978-0-8176-4923-4 ▶ 109.95 €
Statistical Modelling and Regression Structures

Festschrift in Honour of Ludwig Fahrmeir

The contributions collected in this book have been written by well-known statisticians to acknowledge Ludwig Fahrmeir’s far-reaching impact on Statistics as a science, while celebrating his 65th birthday. The contributions cover broad areas of contemporary statistical model building, including semiparametric and geadditive regression, Bayesian inference in complex regression models, time series modelling, statistical regularization, graphical models and stochastic volatility models.

More on [link](http://www.springer.com/978-3-7908-2412-4)
Due January 2010
978-3-7908-2412-4 ► approx. 79,95 €

Statistics and Computing / Statistics Programs

Forthcoming

P. Mantovan, P. Secchi

Complex data modeling and computationally intensive statistical methods

The last years have seen the advent and development of many devices able to record and store an always increasing amount of complex and high dimensional data; 3D images generated by medical scanners or satellite remote sensing, DNA microarrays, real time financial data, system control datasets, ... The analysis of this data poses new challenging problems and requires the development of novel statistical models and computational methods, fueling many fascinating and fast growing research areas of modern statistics. The book offers a wide variety of statistical methods and is addressed to statisticians working at the forefront of statistical analysis.

More on [link](http://www.springer.com/978-88-470-1385-8)
Due February 2010
2010. Approx. 300 p. (Contributions to Statistics, )
978-88-470-1385-8 ► 69,95 €

Introducing Monte Carlo Methods with R

Computational techniques based on simulation have now become an essential part of the statistician’s toolbox. It is thus crucial to provide statisticians with a practical understanding of those methods, and there is no better way to develop intuition and skills for simulation than to use simulation to solve statistical problems. Introducing Monte Carlo Methods with R covers the main tools used in statistical simulation from a programmer’s point of view, explaining the R implementation of each simulation technique and providing the output for better understanding and comparison. While this book constitutes a comprehensive treatment of simulation methods, the theoretical justification of those methods has been considerably reduced, compared with Robert and Casella (2004). Similarly, the more exploratory and less stable solutions are not covered here. This book does not require a preliminary exposure to the R programming language or to Monte Carlo methods, nor an advanced mathematical background. While many examples are set within a Bayesian framework, advanced expertise in Bayesian statistics is not required. The book covers basic random generation algorithms, Monte Carlo techniques for integration and optimization, convergence diagnoses, Markov chain Monte Carlo methods, including Metropolis-Hastings and Gibbs algorithms, and adaptive algorithms. All chapters include exercises and all R programs are available as an R package called mcsm. The book appeals to anyone with a practical interest in simulation methods but no previous exposure. It is meant to be useful for students and practitioners in areas such as statistics, signal processing, communications engineering, control theory, econometrics, finance and more. The programming parts are introduced progressively to be accessible to any reader.

Christian P. Robert is Professor of Statistics at Université Paris Dauphine, and Head of the Statistics Laboratory of CREST, both in Paris, France. He has authored more than 150 papers in applied probability, Bayesian statistics and simulation methods. He is a fellow of the Institute of Mathematical Statistics and the recipient of an IMS Medallion. He has authored eight other books, including The Bayesian Choice which received the ISBA DeGroot Prize in 2004, Monte Carlo Statistical Methods with George Casella, and Bayesian Core with Jean-Michel Marin. He has served as Joint Editor of the Journal of the Royal Statistical Society Series B, as well as an associate editor for most major statistical journals, and was the 2008 ISBA President. George Casella is Distinguished Professor in the Department of Statistics at the University of Florida. He is active in both theoretical and applied statistics, is a fellow of the Institute of Mathematical Statistics and the American Statistical Association, and a Foreign Member of the Spanish Royal Academy of Sciences. He has served as Theory and Methods Editor of the Journal of the American Statistical Association, as Executive Editor of Statistical Science, and as Joint Editor of the Journal of the Royal Statistical Society Series B. In addition to books with Christian Robert, he has written Variance Components, 1992, with S.R. Searle and C.E. McCulloch; Statistical Inference, Second Edition, 2001, with Roger Berger; and Theory of Point Estimation, Second Edition, 1998, with Erich Lehmann. His latest book is Statistical Design 2008.

More on [link](http://www.springer.com/978-1-4419-1575-7)
Due January 2010
2010. XX, 284 p. (Use R, )
978-1-4419-1575-7 ► 54,95 €

Statistics for Business, Economics, Mathematical Finance, Insurance

H. Gatignon

Statistical Analysis of Management Data

Statistical Analysis of Management Data provides a comprehensive approach to multivariate statistical analyses that are important for researchers in all fields of management, including finance, production, accounting, marketing, strategy, technology, and human resources. This book is especially designed to provide doctoral students with a theoretical knowledge of the concepts underlying the most important multivariate techniques and an overview of actual applications. It offers a clear, succinct exposition of each technique with emphasis on when each technique is appropriate and how to use it. This second edition, fully revised, updated, and expanded, reflects the most current evolution in the methods for data analysis in management and the social sciences. In particular, it places a greater emphasis on measurement models, and includes new chapters and sections on: confirmatory factor analysis; canonical correlation analysis; cluster analysis; Multivariate methods for data analysis; multi-group confirmatory factor analysis; and analysis of covariance structures. Featuring numerous examples, the book may serve as an advanced text or as a resource for applied researchers in industry who want to understand the foundations of the meth-
Statistics for Life Sciences, Medicine, Health Sciences

Advances in Social Science Research Using R

This book covers recent advances for quantitative researchers with practical examples from social sciences. The twelve chapters written by distinguished authors cover a wide range of issues— all providing practical tools using the free R software. McCulloch: R can be used for reliable statistical computing, whereas most statistical and econometric software cannot. This is illustrated by the effect of abortion on crime. Koenker: Additive models provide a clever compromise between parametric and non-parametric components illustrated by risk factors for Indian malnutrition. Gelman: R graphics in the context of voter participation in US elections. Vinod: New solutions to the old problem of efficient estimation despite autocorrelation and heteroscedasticity among regression errors are proposed and illustrated by the Phillips curve tradeoff between inflation and unemployment. Markus and Gu: New R tools for exploratory data analysis including bubble plots. Vinod, Hsu and Tian: New R tools for portfolio selection borrowed from computer scientists and data-mining experts; relevant to anyone with an investment portfolio. Foster and Kecojevic: Extends the usual analysis of covariance (ANCOVA) illustrated by growth charts for Saudi children. Imai, Keele, Tingley, and Yamamoto: New R tools for solving the age-old scientific problem of assessing the direction and strength of causation. Their job search illustration is of interest during the current times of high unemployment. Haupt, Schnurbus, and Tschernig: Consider the choice of functional form for an unknown, potentially nonlinear relationship, explaining a set of new R tools for model visualization and validation. Rindskopf: R methods to fit a multinomial based multivariate analysis of variance (ANOVA) with examples from psychology, sociology, political science, and medicine. Neath: R tools for Bayesian posterior distributions to study increased disease risk in proximity to a hazardous waste site. Numata and Rengifo: Explain persistent discrete jumps in financial series subject to misspecification.


Available
978-1-4419-1769-5 ▶ 129,95 €

Forthcoming
H.D. Vinod

Modern Infectious Disease Epidemiology

Concepts, Methods, Mathematical Models, and Public Health

Hardly a day goes by without news headlines concerning infectious disease threats. Currently the spectre of a pandemic of influenza A/H1N1 is raising its head, and heated debates are taking place about the pro’s and con’s of vaccinating young girls against human papilloma virus. For an evidence-based and responsible communication of infectious disease topics to avoid misunderstandings and overreaction of the public, we need solid scientific knowledge and an understanding of all aspects of infectious diseases and their control. The aim of our book is to present the reader with the general picture and the main ideas of the subject. The book introduces the reader to methodological aspects of epidemiology that are specific for infectious diseases and provides insight into the epidemiology of some classes of infectious diseases characterized by their main modes of transmission. This choice of topics bridges the gap between scientific research on the clinical, biological, mathematical, social and economic aspects of infectious diseases and their applications in public health. The book will help the reader to understand the impact of infectious diseases on modern society and the instruments that policy makers have at their disposal to deal with these challenges. It is written for students of the health sciences, both of curative medicine and public health, and for experts that are active in these and related domains, and it may be of interest for the educated layman since the technical level is kept relatively low. The authors are internationally renowned experts in the field of infectious disease epidemiology. The editors come from different scientific backgrounds but have been devoted to research in infectious disease epidemiology for many years. Alexander Krämer is an internist and epidemiologist who co-founded the first School of Public Health in the German-speaking region of Europe at the University of Bielefeld. Mirjam Kretzschmar is a mathematician and epidemiologist with many contributions to mathematical modelling of infectious diseases and its applications for public health. Klaus Krickeberg is a mathematician with background in health information systems in developing countries.


Due January 2010
2010. XVI, 443 p. (Statistics for Biology and Health, )
978-0-387-93834-9 ▶ 79,95 €

Analysing Seasonal Health Data

Seasonal patterns have been found in a remarkable range of health conditions, including birth defects, respiratory infections and cardiovascular disease. Accurately estimating the size and timing of seasonal peaks in disease incidence is an aid to understanding the causes and possibly to developing interventions. With global warming increasing the intensity of seasonal weather patterns around the world, a review of the methods for estimating seasonal effects on health is timely. This is the first book on statistical methods for seasonal data written for a health audience. It describes methods for a range of outcomes (including continuous, count and binomial data) and demonstrates appropriate techniques for summarising and modelling these data. It has a practical focus and uses interesting examples to motivate and illustrate the methods. The statistical procedures and example data sets are available in an R package called ‘season’. Adrian Barnett is a senior research fellow at Queensland University of Technology, Australia. Annette Dobson is a Professor of Biostatistics at The University of Queensland, Australia. Both are experienced medical statisticians with a commitment to statistical education and have previously collaborated in publications. Barnett and Kretzschmar: Extends the usual analysis of covariance (ANCOVA) illustrated by growth charts for Saudi children. Imai, Keele, Tingley, and Yamamoto: New R tools for solving the age-old scientific problem of assessing the direction and strength of causation. Their job search illustration is of interest during the current times of high unemployment. Haupt, Schnurbus, and Tschernig: Consider the choice of functional form for an unknown, potentially nonlinear relationship, explaining a set of new R tools for model visualization and validation. Rindskopf: R methods to fit a multinomial based multivariate analysis of variance (ANOVA) with examples from psychology, sociology, political science, and medicine. Neath: R tools for Bayesian posterior distributions to study increased disease risk in proximity to a hazardous waste site. Numata and Rengifo: Explain persistent discrete jumps in financial series subject to misspecification.

More on www.springer.com/978-3-642-10747-4

Due February 2010
2010. XIV, 168 p. (Statistics for Biology and Health, )
978-3-642-10747-4 ▶ 69,95 €

Due February 2010
978-1-4419-1769-5 ▶ 69,95 €
Elements of Adaptive Testing

The arrival of the computer in educational and psychological testing has led to the current popularity of adaptive testing---a testing format in which the computer uses statistical information about the test items to automatically adapt their selection to a real-time update of the test taker's ability estimate. This book covers such key features of adaptive testing as item selection and ability estimation, adaptive testing with multidimensional abilities, sequencing adaptive test batteries, multistage adaptive testing, item-pool design and maintenance, estimation of item and item-family parameters, item and person fit, as well as adaptive mastery and classification testing. It also shows how these features are used in the daily operations of several large-scale adaptive testing programs.

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System Identification with Quantized Observations

The ability to identify systems in which only quantized output observations are available is often extremely important in real-world situations. Due to sensor limitations, signal quantization, or coding for communications, many older methodologies fall short in building dynamic models from these observations. This work presents new methodologies that utilize quantized information in system identification and explores their potential in extending control capabilities for systems with limited sensor information or networked systems. The results of these methodologies can be applied to systems and control design, communication and computer networks, signal processing, sensor networks, mobile agents, data fusion, remote sensing, telemedicine, and any field in which noise-corrupted quantized data need to be processed.

Forthcoming

L.Y. Wang, G.G. Yin, J. Zhang, Y. Zhao

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