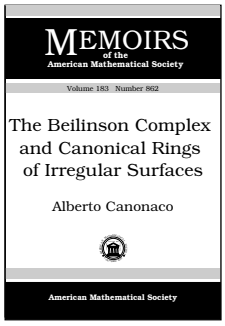
New Publications Offered by the AMS

Algebra and Algebraic Geometry



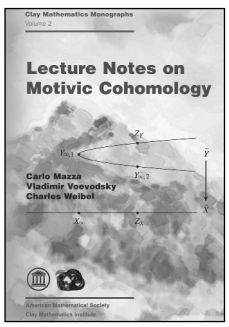
The Beilinson Complex and Canonical Rings of Irregular Surfaces

Alberto Canonaco, *Universitá di Pavia*

Contents: Introduction; Graded schemes; Beilinson's theorem on $\mathbb{P}(w)$; The theorem on weighted canonical projections; Applications to surfaces with $p_g = q = 2$, $K^2 = 4$; Abelian categories and derived categories; Bibliography; Index.

Memoirs of the American Mathematical Society, Volume 183, Number 862

July 2006, 99 pages, Softcover, ISBN-10: 0-8218-4193-9, ISBN-13: 978-0-8218-4193-8, LC 2006045732, 2000 *Mathematics Subject Classification*: 14A20, 14M99, 14F05, 14J29; 13A02, 18E30, 14K05, **Individual member US$35**, List US$58, Institutional member US$46, Order code MEMO/183/862



Lecture Notes on Motivic Cohomology

Carlo Mazza, *Rutgers University, Piscataway, NJ*, **Vladimir Voevodsky**, *Institute for Advanced Study, Princeton, NJ*, and **Charles Weibel**, *Rutgers University, New Brunswick, NJ*

The notion of a motive is an elusive one, like its namesake "the motif" of Cezanne's impressionist method of painting. Its existence was first suggested by Grothendieck in 1964 as the underlying structure behind the myriad cohomology theories in Algebraic Geometry. We now know that there is a triangulated theory of motives, discovered by Vladimir Voevodsky, which suffices for the development of a satisfactory Motivic Cohomology theory. However, the existence of motives themselves remains conjectural.

This book provides an account of the triangulated theory of motives. Its purpose is to introduce Motivic Cohomology, to develop its main properties, and finally to relate it to other known invariants of algebraic varieties and rings such as Milnor K-theory, étale cohomology, and Chow groups. The book is divided into lectures, grouped in six parts. The first part presents the definition of Motivic Cohomology, based upon the notion of presheaves with transfers. Some elementary comparison theorems are given in this part. The theory of (étale, Nisnevich, and Zariski) sheaves with transfers is developed in parts two, three, and six, respectively. The theoretical core of the book is the fourth part, presenting the triangulated category of motives. Finally, the comparison with higher Chow groups is developed in part five.

The lecture notes format is designed for the book to be read by an advanced graduate student or an expert in a related field. The lectures roughly correspond to one-hour lectures given by Voevodsky during the course he gave at the Institute for Advanced Study in Princeton on this subject in 1999–2000. In addition, many of the original proofs have been simplified and improved so that this book will also be a useful tool for research mathematicians.

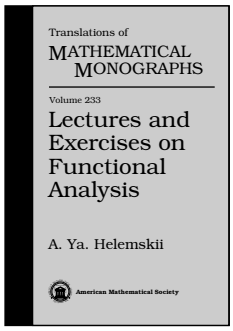
Titles in this series are copublished with the Clay Mathematics Institute (Cambridge, MA).

Contents: *Presheaves with transfers:* The category of finite correspondences; Presheaves with transfers; Motivic cohomology; Weight one motivic cohomology; Relation to Milnor K-theory; *Étale motivic theory:* Étale sheaves with transfers; The relative Picard group and Suslin's rigidity theorem; Derived tensor products; $\mathbb{A}^1$-weak equivalence; Étale motivic cohomology and algebraic singular homology; *Nisnevich sheaves with transfers:* Standard triples; Nisnevich sheaves; Nisnevich sheaves with transfers; *The triangulated category of motives:* The category of motives; The complex $\mathbb{Z}(n)$ and $\mathbb{P}^n$; Equidimensional cycles; *Higher Chow groups:* Higher Chow groups; Higher Chow groups and equidimensional cycles; Motivic cohomology and higher Chow groups; Geometric motives; *Zariski sheaves with transfers:* Covering morphisms of triples; Zariski sheaves with transfers; Contractions; Homotopy invariance of cohomology; Bibliography; Glossary; Index.

Clay Mathematics Monographs, Volume 2

September 2006, 216 pages, Hardcover, ISBN-10: 0-8218-3847-4, ISBN-13: 978-0-8218-3847-1, LC 2006045973, 2000 *Mathematics Subject Classification*: 14F42; 19E15, 14C25, 14–01, 14F20, **All AMS members US$36**, List US$45, Order code CMIM/2

Analysis



Lectures and Exercises on Functional Analysis

A. Ya. Helemskii, *Moscow State University, Russia*

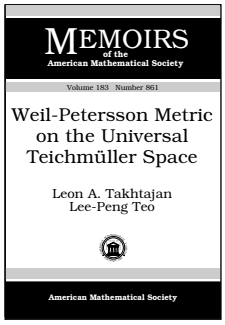
The book is based on courses taught by the author at Moscow State University. Compared to many other books on the subject, it is unique in that the exposition is based on extensive use of the language and elementary constructions of category theory. Among topics featured in the book are the theory of Banach and Hilbert tensor products, the theory of distributions and weak topologies, and Borel operator calculus.

The book contains many examples illustrating the general theory presented, as well as multiple exercises that help the reader to learn the subject. It can be used as a textbook on selected topics of functional analysis and operator theory. Prerequisites include linear algebra, elements of real analysis, and elements of the theory of metric spaces.

Contents: Foundations: Categories and the like; Normed spaces and bounded operators ("Waiting for completeness"); Banach spaces and their advantages; From compact spaces to Fredholm operators; Polynormed spaces, weak topologies, and generalized functions; At the gates of spectral theory; Hilbert adjoint operators and the spectral theorem; Fourier transform; Bibliography; Index.

Translations of Mathematical Monographs, Volume 233

September 2006, 468 pages, Hardcover, ISBN-10: 0-8218-4098-3, ISBN-13: 978-0-8218-4098-6, LC 2005053605, 2000 *Mathematics Subject Classification*: 46–01, 47–01, **All AMS members US$103**, List US$129, Order code MMONO/233



Weil-Petersson Metric on the Universal Teichmüller Space

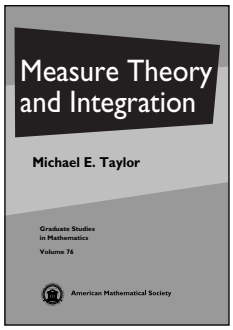
Leon A. Takhtajan, *SUNY at Stony Brook, Stony Brook, NY*, and **Lee-Peng Teo**

Contents: Introduction; Curvature Properties and Chern Forms; Kähler Potential and Period Mapping; Appendix A. The Hilbert Manifold Structure of $\mathcal{T}_0(1)$; Appendix B. The Period Mapping $\hat{\mathcal{P}}$; Bibliography.

Memoirs of the American Mathematical Society, Volume 183, Number 861

July 2006, 119 pages, Softcover, ISBN-10: 0-8218-3936-5, ISBN-13: 978-0-8218-3936-2, LC 2006045733, 2000 *Mathematics Subject Classification*: 30F60; 30C55, 32G15, 46E20, 58B20, 58B25, **Individual member US$36**, List US$60, Institutional member US$48, Order code MEMO/183/861

COURSE ADOPTION



Measure Theory and Integration

Michael E. Taylor, *University of North Carolina, Chapel Hill, NC*

This self-contained treatment of measure and integration begins with a brief review of the Riemann integral and proceeds to a construction of Lebesgue measure on the real line. From there the reader is led to the general notion of measure, to the construction of the Lebesgue integral on a measure space, and to the major limit theorems, such as the Monotone and Dominated Convergence Theorems. The treatment proceeds to L^p spaces, normed linear spaces that are shown to be complete (i.e., Banach spaces) due to the limit theorems. Particular attention is paid to L^2 spaces as Hilbert spaces, with a useful geometrical structure.

Having gotten quickly to the heart of the matter, the text proceeds to broaden its scope. There are further constructions of measures, including Lebesgue measure on n-dimensional Euclidean space. There are also discussions of surface measure, and more generally of Riemannian manifolds and the measures they inherit, and an appendix on the integration of differential forms. Further geometric aspects are explored in a chapter on Hausdorff measure. The text also treats probabilistic concepts, in chapters on ergodic theory, probability spaces and random variables, Wiener measure and Brownian motion, and martingales.

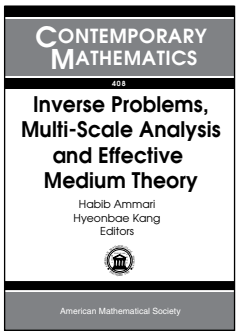
This text will prepare graduate students for more advanced studies in functional analysis, harmonic analysis, stochastic analysis, and geometric measure theory.

Contents: The Riemann integral; Lebesgue measure on the line; Integration on measure spaces; L^p spaces; The Caratheodory construction of measures; Product measures; Lebesgue measure on $\mathbb{R}^n$ and on manifolds; Signed measures and complex measures; L^p spaces, II; Sobolev spaces; Maximal functions and a.e. phenomena; Hausdorff's r-dimensional measures; Radon measures; Ergodic theory; Probability spaces and random variables; Wiener measure and Brownian motion; Conditional expectation and martingales; Metric spaces, topological spaces, and compactness; Derivatives, diffeomorphisms, and manifolds; The Whitney Extension Theorem; The Marcinkiewicz Interpolation Theorem; Sard's Theorem; A change of variable theorem for many-to-one maps; Integration of differential forms; Change of variables revisited; The Gauss-Green formula on Lipschitz domains; Bibliography; Symbol index; Subject index.

Graduate Studies in Mathematics, Volume 76

August 2006, 319 pages, Hardcover, ISBN-10: 0-8218-4180-7, ISBN-13: 978-0-8218-4180-8, LC 2006045635, 2000 *Mathematics Subject Classification*: 28–01, **All AMS members US$47**, List US$59, Order code GSM/76

Applications



Inverse Problems, Multi-Scale Analysis, and Effective Medium Theory

Habib Ammari, *Ecole Polytechnique, Palaiseau, France*, and **Hyeonbae Kang**, *Seoul National University, Korea*, Editors

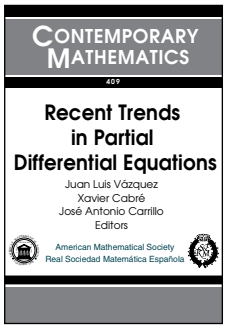
Recent developments in inverse problems, multi-scale analysis and effective medium theory reveal that these fields share several fundamental concepts. This book is the proceedings of the research conference, "Workshop in Seoul: Inverse Problems, Multi-Scale Analysis and Homogenization," held at Seoul National University, June 22–24, 2005. It highlights the benefits of sharing ideas among these areas, of merging the expertise of scientists working there, and of directing interest towards challenging issues such as imaging nanoscience and biological imaging. Contributions are written by prominent experts and are of interest to researchers and graduate students interested in partial differential equations and applications.

Contents: H. Ammari and **H. Kang**, Generalized polarization tensors, inverse conductivity problems, and dilute composite materials: A review; **Y. Capdeboscq** and **H. Kang**, Improved bounds on the polarization tensor for thick domains; **H. Kang** and **G. W. Milton**, On conjectures of Polya-Szegö and Eshelby; **K. Houzaki**, **N. Nishimura**, and **Y. Otani**, An FMM for periodic rigid-inclusion problems and its application to homogenisation; **H. Cheng**, **W. Crutchfield**, **Z. Gimbutas**, **L. Greengard**, **J. Huang**, **V. Rokhlin**, **N. Yarvin**, and **J. Zhao**, Remarks on the implementation of the wideband FMM for the Helmholtz equation in two dimensions; **T. Hou**, **D. Yang**, and **H. Ran**, Multiscale computation of isotropic homogeneous turbulent flow; **N. Albin** and **A. Cherkaev**, Optimality conditions on fields in microstructures and controllable differential schemes; **M. Fink**, Time-reversal acoustics; **G. Dassios**, What is recoverable in the inverse magnetoencephalography problem?; **J. J. Liu**, **H. C. Pyo**, **J. K. Seo**, and **E. J. Woo**, Convergence properties and stability issues in MREIT algorithm; **G. Nakamura**, **G. Uhlmann**, and **J.-N. Wang**, Oscillating-decaying solutions for elliptic systems; **M. Ikehata**, Stroh eigenvalues and identification of discontinuity in an anisotropic elastic material; **G. Nakamura**, **R. Potthast**, and **M. Sini**, A comparative study between some non-iterative methods for the inverse scattering.

Contemporary Mathematics, Volume 408

September 2006, approximately 251 pages, Softcover, ISBN-10: 0-8218-3968-3, ISBN-13: 978-0-8218-3968-3, LC 2006042683, 2000 *Mathematics Subject Classification*: 35R30, 35B27, 35C20, 35Q60, 35J05, 45Q05, 65M32, 78M15, 65R20, 65N21, **All AMS members US$55**, List US$69, Order code CONM/408

Differential Equations



Recent Trends in Partial Differential Equations

Juan Luis Vázquez, *Universidad Autónoma de Madrid, Spain*, **Xavier Cabré**, *Universitat Politècnica de Catalunya, Barcelona, Spain*, and **José Antonio Carrillo**, *Universitat Autònoma de Barcelona, Bellaterra, Spain*, Editors

This volume contains the research and expository articles for the courses and talks given at the UIMP-RSME Lluis A. Santaló Summer School, "Recent Trends in Partial Differential Equations". The goal of the Summer School was to present some of the many advances that are currently taking place in the interaction between nonlinear partial differential equations and their applications to other scientific disciplines. Oriented to young post-docs and advanced doctoral students, the courses dealt with topics of current interest.

Some of the tools presented are quite powerful and sophisticated. These new methods are presented in an expository manner or applied to a particular example to demonstrate the main ideas of the method and to serve as a handy introduction to further study. Young researchers in partial differential equations and colleagues from neighboring fields will find these notes a good addition to their libraries.

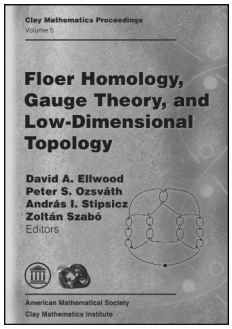
This is a joint publication of the Real Sociedad Matemática Española and the American Mathematical Society.

Contents: L. Ambrosio, Steepest descent flows and applications to spaces of probability measures; **L. Desvillettes**, Hypocoercivity: the example of linear transport; **H. Koch** and **E. Zuazua**, A hybrid system of PDE's arising in multi-structure interaction: Coupling of wave equations in n and $n-1$ space dimensions; **A. Aftalion**, Some rigorous results for vortex patterns in Bose-Einstein condensates; **M. Escobedo** and **S. Mischler**, Qualitative properties of some Boltzmann like equations which do not fulfill a detailed balance condition.

Contemporary Mathematics, Volume 409

August 2006, 123 pages, Softcover, ISBN-10: 0-8218-3891-1, ISBN-13: 978-0-8218-3891-4, LC 2006042816, 2000 *Mathematics Subject Classification*: 35B37, 35B40, 35K55, 49Q20, 74F10, 82C10, **All AMS members US$39**, List US$49, Order code CONM/409

Geometry and Topology



Floer Homology, Gauge Theory, and Low-Dimensional Topology

David A. Ellwood, *Clay Mathematics Institute, Cambridge, MA*, **Peter S. Ozsváth**, *Columbia University, New York, NY*, **András I. Stipsicz**, *Rényi Institute, Budapest, Hungary*, and **Zoltán Szabó**, *Princeton University, NJ*, Editors

Mathematical gauge theory studies connections on principal bundles, or, more precisely, the solution spaces of certain partial differential equations for such connections. Historically, these equations have come from mathematical physics, and play an important role in the description of the electro-weak and strong nuclear forces. The use of gauge theory as a tool for studying topological properties of four-manifolds was pioneered by the fundamental work of Simon Donaldson in the early 1980s, and was revolutionized by the introduction of the Seiberg–Witten equations in the mid-1990s. Since the birth of the subject, it has retained its close connection with symplectic topology. The analogy between these two fields of study was further underscored by Andreas Floer's construction of an infinite-dimensional variant of Morse theory that applies in two a priori different contexts: either to define symplectic invariants for pairs of Lagrangian submanifolds of a symplectic manifold, or to define topological invariants for three-manifolds, which fit into a framework for calculating invariants for smooth four-manifolds. "Heegaard Floer homology", the recently-discovered invariant for three- and four-manifolds, comes from an application of Lagrangian Floer homology to spaces associated to Heegaard diagrams. Although this theory is conjecturally isomorphic to Seiberg–Witten theory, it is more topological and combinatorial in flavor and thus easier to work with in certain contexts. The interaction between gauge theory, low-dimensional topology, and symplectic geometry has led to a number of striking new developments in these fields. The aim of this volume is to introduce graduate students and researchers in other fields to some of these exciting developments, with a special emphasis on the very fruitful interplay between disciplines.

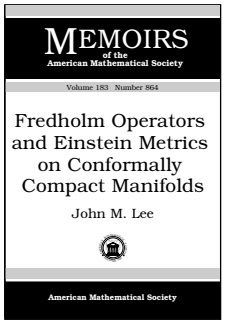
This volume is based on lecture courses and advanced seminars given at the 2004 Clay Mathematics Institute Summer School at the Alfréd Rényi Institute of Mathematics in Budapest, Hungary. Several of the authors have added a considerable amount of additional material to that presented at the school, and the resulting volume provides a state-of-the-art introduction to current research, covering material from Heegaard Floer homology, contact geometry, smooth four-manifold topology, and symplectic four-manifolds.

Titles in this series are copublished with the Clay Mathematics Institute (Cambridge, MA).

Contents: *Heegaard Floer homology and knot theory:* **P. S. Ozsváth** and **Z. Szabó**, An introduction to Heegaard Floer homology; **P. S. Ozsváth** and **Z. Szabó**, Lectures on Heegaard Floer homology; **H. Goda**, Circle valued Morse theory for knots and links; *Floer homologies and contact structures:* **J. B. Etnyre**, Lectures on open book decompositions and contact structures; **A. I. Stipsicz**, Contact surgery and Heegaard Floer theory; **P. Lisca** and **A. I. Stipsicz**, Ozsváth-Szabó invariants and contact surgery; **T. Ekholm**, Double points of exact Lagrangian immersions and Legendrian contact homology; *Symplectic 4-manifolds and Seiberg-Witten invariants:* **R. Fintushel**, Knot surgery revisited; **R. J. Stern**, Will we ever classify simply-connected smooth 4-manifolds?; **J. Park**, A note on symplectic 4-manifolds with $b_2^+ = 1$ and $K^2 \geq 0$; **T.-J. Li**, The Kodaira dimension of symplectic 4-manifolds; **D. Auroux**, Symplectic 4-manifolds, singular plane curves, and isotopy problems; **I. Smith**, Monodromy, vanishing cycles, knots and the adjoint quotient.

Clay Mathematics Proceedings, Volume 5

August 2006, 297 pages, Softcover, ISBN-10: 0-8218-3845-8, ISBN-13: 978-0-8218-3845-7, LC 2006042815, 2000 *Mathematics Subject Classification*: 57R17, 57R55, 57R57, 57R58, 53D05, 53D40, 57M27, 14J26, **All AMS members US$51**, List US$64, Order code CMIP/5



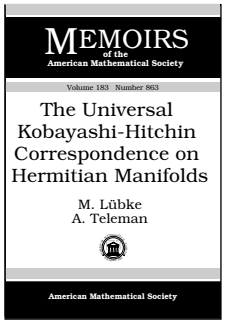
Fredholm Operators and Einstein Metrics on Conformally Compact Manifolds

John M. Lee, *University of Washington, Seattle, WA*

Contents: Introduction; Möbius coordinates; Function spaces; Elliptic operators; Analysis on hyperbolic space; Fredholm theorems; Laplace operators; Einstein metrics; Bibliography.

Memoirs of the American Mathematical Society, Volume 183, Number 864

July 2006, 83 pages, Softcover, ISBN-10: 0-8218-3915-2, ISBN-13: 978-0-8218-3915-7, LC 2006045731, 2000 *Mathematics Subject Classification*: 53C25; 58J05, 58J60, **Individual member US$33**, List US$55, Institutional member US$44, Order code MEMO/183/864



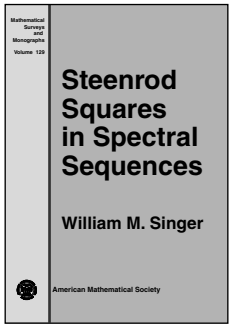
The Universal Kobayashi-Hitchin Correspondence on Hermitian Manifolds

M. Lübke, *Leiden University, The Netherlands*, and **A. Teleman**, *CMI, Marseille, France*

Contents: Introduction; The finite dimensional Kobayashi-Hitchin correspondence; A "universal" complex geometric classification problem; Hermitian-Einstein pairs; Polystable pairs allow Hermitian–Einstein reductions; Examples and applications; Appendix; Bibliography.

Memoirs of the American Mathematical Society, Volume 183, Number 863

July 2006, 97 pages, Softcover, ISBN-10: 0-8218-3913-6, ISBN-13: 978-0-8218-3913-3, LC 2006045238, 2000 *Mathematics Subject Classification*: 53C07, 32G13, 58D27, 53C55, 53D20, 32L05, 32M05, **Individual member US$35**, List US$58, Institutional member US$46, Order code MEMO/183/863



Steenrod Squares in Spectral Sequences

William M. Singer, *Fordham University, Bronx, NY*

This book develops a general theory of Steenrod operations in spectral sequences. It gives special attention to the change-of-rings spectral sequence for the cohomology of an extension of Hopf algebras and to the Eilenberg–Moore spectral sequence for the cohomology of classifying spaces and homotopy orbit spaces. In treating the change-of-rings spectral sequence, the book develops from scratch the necessary properties of extensions of Hopf algebras and constructs the spectral sequence in a form particularly suited to the introduction of Steenrod squares. The resulting theory can be used effectively for the computation of the cohomology rings of groups and Hopf algebras, and of the Steenrod algebra in particular, and so should play a useful role in stable homotopy theory. Similarly the book offers a self-contained construction of the Eilenberg–Moore spectral sequence, in a form suitable for the introduction of Steenrod operations. The corresponding theory is an effective tool for the computation of the cohomology rings of the classifying spaces of the exceptional Lie groups, and it promises to be equally useful for the computation of the cohomology rings of homotopy orbit spaces and of the classifying spaces of loop groups.

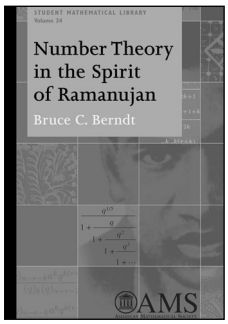
Contents: Conventions; The spectral sequence of a bisimplicial coalgebra; Bialgebra actions on the cohomology of algebras; Extensions of Hopf algebras; Steenrod operations in the change-of-rings spectral sequence; The Eilenberg–Moore spectral sequence; Steenrod operations in the Eilenberg–Moore spectral sequence; Bibliography; Index.

Mathematical Surveys and Monographs, Volume 129

September 2006, 155 pages, Hardcover, ISBN-10: 0-8218-4141-6, ISBN-13: 978-0-8218-4141-9, LC 2006045953, 2000 *Mathematics Subject Classification*: 16E40, 18G25, 18G30, 18G40, 55R20, 55R40, 55S10, 55T05, 55T15, 55T20, **All AMS members US$44**, List US$55, Order code SURV/129

Number Theory

COURSE ADOPTION



Number Theory in the Spirit of Ramanujan

Bruce C. Berndt, *University of Illinois, Urbana-Champaign, IL*

Ramanujan is recognized as one of the great number theorists of the twentieth century. Here now is the first book to provide an introduction to his work in number theory. Most of Ramanujan's work in number theory arose out of q-series and theta functions. This book provides an introduction to these two important subjects and to some of the topics in number theory that are inextricably intertwined with them, including the theory of partitions, sums of squares and triangular numbers, and the Ramanujan tau function. The majority of the results discussed here are originally due to Ramanujan or were rediscovered by him. Ramanujan did not leave us proofs of the thousands of theorems he recorded in his notebooks, and so it cannot be claimed that many of the proofs given in this book are those found by Ramanujan. However, they are all in the spirit of his mathematics.

The subjects examined in this book have a rich history dating back to Euler and Jacobi, and they continue to be focal points of contemporary mathematical research. Therefore, at the end of each of the seven chapters, Berndt discusses the results established in the chapter and places them in both historical and contemporary contexts. The book is suitable for advanced undergraduates and beginning graduate students interested in number theory.

Contents: Introduction; Congruences for $p(n)$ and $\tau(n)$; Sums of squares and sums of triangular numbers; Eisenstein series; The connection between hypergeometric functions and theta functions; Applications of the primary theorem of Chapter 5; The Rogers-Ramanujan continued fraction; Bibliography; Index.

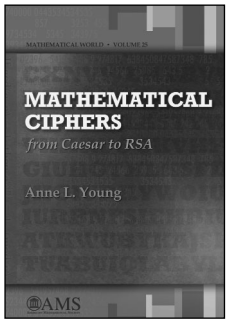
Student Mathematical Library, Volume 34

September 2006, 187 pages, Softcover, ISBN-10: 0-8218-4178-5, ISBN-13: 978-0-8218-4178-5, LC 2006045959, 2000 *Mathematics Subject Classification*: 11Pxx; 11P81, 11P83, 11F20, 11F27, 11A55, 33C75, 33E05, **All AMS members US$28**, List US$35, Order code STML/34

Mathematical Ciphers

From Caesar to RSA

COURSE ADOPTION



Anne L. Young, *Loyola College in Maryland, Baltimore, MD*

A cipher is a scheme for creating coded messages for the secure exchange of information. Throughout history, many different coding schemes have been devised. One of the oldest and simplest mathematical systems was used by Julius Caesar. This is where *Mathematical Ciphers* begins. Building on that simple system, Young moves on to more complicated schemes, ultimately ending with the RSA cipher, which is used to provide security for the Internet.

This book is structured differently from most mathematics texts. It does not begin with a mathematical topic, but rather with a cipher. The mathematics is developed as it is needed; the applications motivate the mathematics. As is typical in mathematics textbooks, most chapters end with exercises. Many of these problems are similar to solved examples and are designed to assist the reader in mastering the basic material. A few of the exercises are one-of-a-kind, intended to challenge the interested reader.

Implementing encryption schemes is considerably easier with the use of the computer. For all the ciphers introduced in this book, JavaScript programs are available from the Web.

In addition to developing various encryption schemes, this book also introduces the reader to number theory. Here, the study of integers and their properties is placed in the exciting and modern context of cryptology. *Mathematical Ciphers* can be used as a textbook for an introductory course in mathematics for all majors. The only prerequisite is high school mathematics.

This item will also be of interest to those working in applications.

Contents: Introduction; Caesar cipher; Terminology and results from number theory; Modular arithmetic; Describing the Caesar cipher mathematically; Cryptanalysis for the Caesar cipher; Multiplication cipher; Cryptanalysis for the multiplication cipher; Multiplication-shift cipher; Cryptanalysis for the multiplication-shift cipher; Non-mathematical substitution ciphers; Preparing to generalize; Finding inverses modulo n; General multiplication-shift cipher; Security of the general multiplication-shift cipher; Introduction to the exponential cipher; Deciphering the exponential cipher; Cryptanalysis for the exponential cipher; Mathematical basis for the exponential cipher; Public key ciphers; RSA cipher; Signatures; Security and implementation of the RSA cipher; Computer programs; Further reading; Answers to selected exercises; Index.

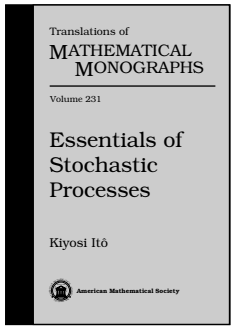
Mathematical World, Volume 25

October 2006, 159 pages, Softcover, ISBN-10: 0-8218-3730-3, ISBN-13: 978-0-8218-3730-6, LC 2006042991, 2000 *Mathematics Subject Classification*: 11–01, 11T71, 94–01, 94A60, **All AMS members US$23**, List US$29, Order code MAWRLD/25

Probability

COURSE ADOPTION

Essentials of Stochastic Processes



Kiyosi Itô, *Kyoto University, Japan*

This book is an English translation of Kiyosi Itô's monograph published in Japanese in 1957. It gives a unified and comprehensive account of additive processes (or Lévy processes), stationary processes, and Markov processes, which constitute the three most important classes of stochastic processes. Written by one of the leading experts in the field, this volume presents to the reader lucid explanations of the fundamental concepts and basic results in each of these three major areas of the theory of stochastic processes.

With the requirements limited to an introductory graduate course on analysis (especially measure theory) and basic probability theory, this book is an excellent text for any graduate course on stochastic processes.

Kiyosi Itô is famous throughout the world for his work on stochastic integrals (including the Itô formula), but he has made substantial contributions to other areas of probability theory as well, such as additive processes, stationary processes, and Markov processes (especially diffusion processes), which are topics covered in this book. For his contributions and achievements, he has received, among others, the Wolf Prize, the Japan Academy Prize, and the Kyoto Prize.

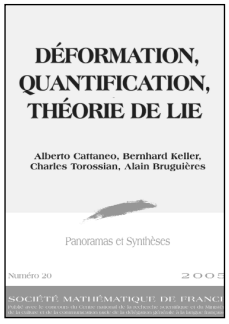
Contents: Basic concepts; Additive processes; Stationary processes; Markov processes; Diffusion; Postscript.

Translations of Mathematical Monographs, Volume 231

July 2006, 171 pages, Hardcover, ISBN-10: 0-8218-3898-9, ISBN-13: 978-0-8218-3898-3, LC 2006042673, 2000 *Mathematics Subject Classification*: 60–02, 60E07, 60G10, 60J25, 60J60, 60G51; 60G52, 60J35, **All AMS members US$55**, List US$69, Order code MMONO/231

New AMS-Distributed Publications

Geometry and Topology



Déformation, Quantification, Théorie de Lie

Alberto Cattaneo, *University of Zurich, Switzerland*, **Bernhard Keller**, *University of Paris VII, France*, **Charles Torossian**, *DMA-ENS, Paris, France*, and **Alain Bruguières**, *Université Montpellier II, France*

In 1997, M. Kontsevich proved that every Poisson manifold admits a formal quantization, canonical up to equivalence. In doing so he solved a longstanding problem in mathematical physics. Through his proof and his interpretation of a later proof given by Tamarkin, he also opened up new research avenues in Lie theory, quantum group theory, deformation theory and the study of operads ... and uncovered fascinating links of these topics with number theory, knot theory and the theory of motives. Without doubt, his work on deformation quantization will continue to influence these fields for many years to come. In the three parts of this volume, we will 1) present the main results of Kontsevich's 1997 preprint and sketch his interpretation of Tamarkin's approach, 2) show the relevance of Kontsevich's theorem for Lie theory and 3) explain the idea from topological string theory which inspired Kontsevich's proof. An appendix is devoted to the geometry of configuration spaces.

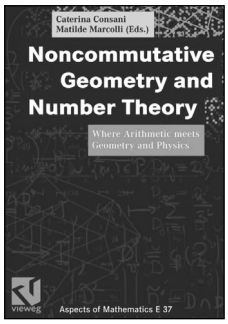
This item will also be of interest to those working in algebra and algebraic geometry and mathematical physics.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: Introduction; Introduction (English translation); *Part I. Deformation quantization after Kontsevich and Tamarkin (B. Keller):* Presentation of the main results; Deformation theory; On Tamarkin's approach; *Part II. Application à la théorie de Lie (C. Torossian):* Introduction; La formule de Kontsevich pour $\mathbb{R}^n$; Exemples de calculs de graphes; Application au cas des algèbres de Lie; Formalité dans le cas $\mathbb{R}^n$; *Part III. Deformation quantization from functional integrals (A. Cattaneo):* Introduction; Functional integrals; Symmetries and the BRST formalism; The Poisson sigma model; Deformation quantization of affine Poisson structures; *Appendice (A. Bruguières):* Espaces de configurations; Bibliographie; Index.

Panoramas et Synthèses, Number 20

April 2006, 186 pages, Softcover, ISBN-10: 2-85629-183-X, ISBN-13: 978-2-85629-183-2, 2000 *Mathematics Subject Classification*: 53D55; 16E40, 53D17, 81S10, 22E45, **Individual member US$34**, List US$38, Order code PASY/20



Noncommutative Geometry and Number Theory

Where Arithmetic meets Geometry and Physics

Caterina Consani, *Johns Hopkins University, Baltimore, MD*, and **Matilde Marcolli**, *Max-Planck-Institut für Mathematik, Bonn, Germany*, Editors

In recent years, number theory and arithmetic geometry have been enriched by new techniques from noncommutative geometry, operator algebras, dynamical systems, and K-Theory. This volume collects and presents up-to-date research topics in arithmetic and noncommutative geometry and ideas from physics that point to possible new connections between the fields of number theory, algebraic geometry and noncommutative geometry. The articles collected in this volume present new noncommutative geometry perspectives on classical topics of number theory and arithmetic such as modular forms, class field theory, the theory of reductive p-adic groups, Shimura varieties, the local L-factors of arithmetic varieties. They also show how arithmetic appears naturally in noncommutative geometry and in physics, in the residues of Feynman graphs, in the properties of noncommutative tori, and in the quantum Hall effect.

This item will also be of interest to those working in number theory.

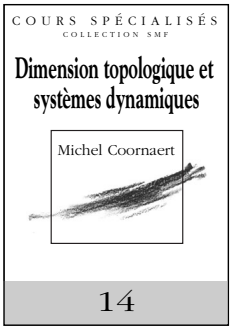
A publication of Vieweg Verlag. The AMS is exclusive distributor in North America. Vieweg Verlag Publications are available worldwide from the AMS outside of Germany, Switzerland, Austria, and Japan.

Contents: A.-M. Aubert, **P. Baum**, and **R. Plymen**, The Hecke algebra of a reductive p-adic group: a view from noncommutative geometry; **D. Blasius**, Hilbert modular forms and the Ramanujan conjecture; **F. P. Boca** and **A. Zaharescu**, Farey fractions and two-dimensional tori; **A. Connes** and **H. Moscovici**, Transgression of the Godbillon-Vey class and Rademacher functions; **C. Consani** and **M. Marcolli**, Archimedean cohomology revisited; **A. Fel'shtyn** and **E. Troitsky**, A twisted Burnside theorem for countable groups and Reidemeister numbers; **M. Khalkhali** and **B. Rangipour**, Introduction to Hopf cyclic cohomology; **M. Kim**, The non-abelian (or non-linear) method of Chabauty; **D. Kreimer**, The residues of quantum field theory—numbers we should know; **M. Laca** and **M. van Frankenhuijsen**, Phase transitions with spontaneous symmetry breaking on Hecke C^*-algebras from number fields; **G. Landi**, On harmonic maps in noncommutative geometry; **M. Marcolli** and **V. Mathai**, Towards the fractional quantum Hall effect: a noncommutative geometry perspective; **R. Meyer**, Homological

algebra for Schwartz algebras of reductive p-adic groups; **V. Nistor**, A non-commutative geometry approach to the representation theory of reductive p-adic groups: Homology of Hecke algebras, a survey and some new results; **F. Paugam**, Three examples of non-commutative boundaries of Shimura varieties; **A. Polishchuk**, Holomorphic bundles on 2-dimensional noncommutative toric orbifolds; **R. Ponge**, A new short proof of the local index formula of Atiyah-Singer.

Vieweg Aspects of Mathematics, Volume 37

April 2006, 372 pages, Hardcover, ISBN-10: 3-8348-0170-4, ISBN-13: 978-3-8348-0170-8, 2000 *Mathematics Subject Classification*: 58B34, 11F70, 11F23, 11F80, 11F37, 11F41, 11J71, 11B57, 11K36, 11F32, 11F75, 11G18, 14A22, 14F42, 14G05, 14G40, 14K10, 14G35, 18E30, 19D55, 20G05, 22E50, 32G05, 46L55, 58E20, 70S15, 81T40, **All AMS members US$76**, List US$84, Order code VWAM/37



Dimension topologique et systèmes dynamiques

Michel Coornaert, *University Louis Pasteur, Strasbourg, France*

This book gives a detailed exposition of some elements of dimension theory for topological spaces and dynamical systems: Cech-Lebesgue dimension, dimension of normal spaces, zero-dimensional topological spaces, dimension of polyhedra, Menger-Nöbeling embedding theorem, Gromov mean topological dimension, Jaworski embedding theorem, Lindenstrauss-Weiss StS. It is intended for graduate students, beginning, and mature researchers interested in topology and dynamical systems. Some of the topics treated in the book directly lead to research areas that remain to be explored.

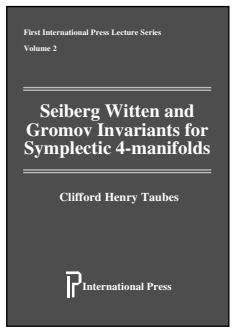
This item will also be of interest to those working in differential equations.

A publication of the Société Mathématique de France, Marseilles (SMF), distributed by the AMS in the U.S., Canada, and Mexico. Orders from other countries should be sent to the SMF. Members of the SMF receive a 30% discount from list.

Contents: *Première partie Dimension topologique:* Dimension d'un espace topologique; Espaces de dimension nulle; Dimension des polyèdres; Dimension et applications; Quelques contre-exemples; *Deuxième partie Dimension topologique moyenne:* Dimension topologique moyenne; Décalages et sous-décalages; Plongements dans les décalages; Bibliographie; Index.

Cours Spécialisés—Collection SMF, Number 14

April 2006, 129 pages, Softcover, ISBN-10: 2-85629-177-5, ISBN-13: 978-2-85629-177-1, 2000 *Mathematics Subject Classification*: 37Bxx, 54F45, **Individual member US$34**, List US$38, Order code COSP/14



Seiberg Witten and Gromov Invariants for Symplectic 4-Manifolds

Clifford Henry Taubes, *Harvard University, Cambridge, MA*

This book provides the complete proof of the remarkable relationship between Seiberg-Witten and Gromov invariants on symplectic 4-manifolds. It is a companion to *Topics on Symplectic 4-manifolds*, published by the International Press (Cambridge, MA) in 1998, and brings together articles published in the *Journal of the American Mathematical Society* and the *Journal of Differential Geometry*.

The book forms the second volume from the International Press Lecture Series held at the University of California at Irvine. It is written at a graduate mathematics level and will be essential reading for mathematicians everywhere.

A publication of International Press. Distributed worldwide by the American Mathematical Society.

Contents: SW $\Rightarrow$ *Gr*: From the Seiberg-Witten equations to pseudo-holomorphic curves; Counting pseudo-holomorphic submanifolds in dimension 4; Gr $\Rightarrow$ *SW*: From pseudo-holomorphic curves to Seiberg-Witten solutions; *Gr* = *SW*: Counting curves and connections.

International Press

November 2005, 405 pages, Hardcover, ISBN-10: 1-57146-089-6, ISBN-13: 978-1-57146-089-9, 2000 *Mathematics Subject Classification*: 51–XX, 53–XX, 54–XX, 57–XX, 58–XX, 14Jxx, **All AMS members US$56**, List US$70, Order code INPR/36.R