Publications From The AMS

SPRING 2020
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FEATURED TEXTBOOKS
association of Galois representations to torsion classes in cohomology. This broad introduction to the subject of perfectoid spaces will be an invaluable asset for any graduate student or researcher interested in the theory of perfectoid spaces and their applications.

READERSHIP: Graduate students and researchers interested in new developments in algebraic geometry and algebraic number theory.


Spectral Structures and Topological Methods in Mathematics
Michael Baake, Universität Bielefeld, Germany, Friedrich Götze, Universität Bielefeld, Germany, and Werner Hoffmann, Universität Bielefeld, Germany, Editors.
This book is a collection of survey articles about spectral structures and the application of topological methods bridging different mathematical disciplines, from pure to applied. The topics are based on work done in the Collaborative Research Centre (SFB) 701.

READERSHIP: Specialists working in both pure and applied mathematics.

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.


Applications of Polynomial Systems
David A. Cox, Amherst College, Amherst, MA with contributions by Carlos D’Andrea, Alicia Dickenstein, Jonathan Hauenstein, Hal Schenck, and Jessica Sidman.
This book explores the geometry and algebra of such systems and includes numerous applications. It begins with elimination theory from Newton to the twenty-first century and then discusses the interaction between algebraic geometry and numerical computations, a subject now called numerical algebraic geometry.

READERSHIP: Graduate students and researchers interested in applications of algebraic geometry.


Analysis

Asymptotic Analysis for Nonlinear Dispersive and Wave Equations
Keiichi Kato, Tokyo University of Science, Japan, Takayoshi Ogawa, Tohoku University, Japan, and Tohru Ozawa, Waseda University, Japan, Editors.
This volume contains 18 papers related to the asymptotic analysis and qualitative research paper concerning the problems of nonlinear wave equations and nonlinear dispersive equations, such as nonlinear Schrödinger equations, the Hartree equation, the Camassa-Holm equation, and the Ginzburg-Landau equations. In one of the papers, the outstanding method developed by Professor Hayashi and his collaborators is introduced by one of his main collaborators, P.I. Naumkin.

READERSHIP: Graduate students and researchers.

Published for the Mathematical Society of Japan by Kinokuniya, Tokyo, and distributed worldwide, except in Japan, by the AMS.


Regular Poisson Manifolds of Compact Types
Marius Crainic, Utrecht University, The Netherlands, Rui Loja Fernandes, University of Illinois at Urbana-Champaign, IL, and David Martínez Torres, Pontifical Catholic University, Rio de Janeiro, Brazil
This is the second paper of a series dedicated to the study of Poisson structures of compact types (PMCTs). In this paper, the authors focus on regular PMCTs, exhibiting a rich transverse geometry. They show that their leaf spaces are integral affine orbifolds.

READERSHIP: Graduate students and research mathematicians.

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.

Astérisque, Number 413, 2019; 156 pp.; softcover; ISBN: 978-2-85629-911-1; List US$68; AMS members US$54.40; Order code: AST/413

Microlocal Analysis of Quantum Fields on Curved Spacetimes
Christian Gérard, Université de Paris 11, Orsay, France
Mathematicians will find this book useful as a rigorous exposition of free quantum fields on curved spacetimes and as an introduction to some interesting and physically important problems arising in this domain. Mathematical physicists may find this text a helpful introduction to the use of more advanced tools of microlocal analysis in this area of research.

READERSHIP: Mathematicians and mathematical physicists.

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.


A Passage to Modern Analysis
William J. Terrell, Virginia Commonwealth University, Richmond, VA
A Passage to Modern Analysis is an extremely well-written and reader-friendly invitation to real analysis. An introductory text for students of mathematics and its applications at the advanced undergraduate and beginning graduate level, it strikes an especially good balance between depth of coverage and accessible exposition. The examples, problems, and exposition open up a student’s intuition but still provide coverage of deep areas of real analysis.

READERSHIP: Undergraduate and graduate students interested in real analysis.

Introduction to Complex Analysis
Michael E. Taylor, University of North Carolina, Chapel Hill, NC

In this text, the reader will learn that all the basic functions that arise in calculus—such as powers and fractional powers, exponentials and logs, trigonometric functions and their inverses, as well as many new functions that the reader will meet—are naturally defined for complex arguments. Furthermore, this expanded setting leads to a much richer understanding of such functions than one could glean by merely considering them in the real domain. This book could serve for either a one-semester course or a two-semester course in complex analysis for beginning graduate students or for well-prepared undergraduates whose background includes multivariable calculus, linear algebra, and advanced calculus.

READERSHIP: Graduate students interested in complex analysis.


Random Matrices
Alexei Borodin, Massachusetts Institute of Technology, Cambridge, MA, Ivan Corwin, Columbia University, New York, NY, and Alice Guionnet, CNRS, ENS Lyon, France, Editors

Random matrix theory has many roots and branches in mathematics, statistics, physics, computer science, data science, numerical analysis, biology, ecology, engineering, and operations research. This book provides a snippet of this vast domain of study, with a particular focus on the notations of universality and integrability. It is appropriate for graduate students and researchers interested in learning techniques and results in random matrix theory from different perspectives and viewpoints.

READERSHIP: Graduate students and researchers interested in random matrix theory and its many applications.

Titles in this series are co-published with the Institute for Advanced Study/Park City Mathematics Institute.

Jordan Triple Systems in Complex and Functional Analysis
José M. Isidro, University of Santiago de Compostela, Galicia, Spain

This book is a systematic account of the impressive developments in the theory of symmetric manifolds achieved over the past fifty years. It contains detailed and friendly but rigorous proofs of the key results in the theory.

READERSHIP: Graduate students interested in complex analysis and the theory of Banach spaces.


A Tool Kit for Groupoid C*-Algebras
Dana P. Williams, Dartmouth College, Hanover, NH

This book provides a detailed introduction to the vast subject area of groupoid C*-algebras and is suitable for graduate students or any researcher who wants to use them in their work. The main focus is to equip the reader with modern versions of the basic technical tools used in the subject, which will allow the reader to understand fundamental results and make contributions to various areas in the subject.

READERSHIP: Graduate students and researchers interested in C*-algebras.


Operator Algebras and Mathematical Physics
Masaki Izumi, Kyoto University, Japan, Yakuyuki Kawahigashi, University of Tokyo, Japan, Motoko Otani, Tohoku University, Japan, Hiroki Matui, Chiba University, Japan, and Narutaka Ozawa, Kyoto University, Japan, Editors

This volume contains the proceedings of an international conference on Operator Algebras and Mathematical Physics, held at Tohoku University in August 2016.

READERSHIP: Graduate students and researchers.

Published for the Mathematical Society of Japan by Kinokuniya, Tokyo, and distributed worldwide, except in Japan, by the AMS.

Strong Regularity
Pierre Berger, Université Paris 13, Villetaneuse, France, and Jean-Christophe Yoccoz, Collège de France, Paris, France

The strong regularity program was initiated by Jean-Christophe Yoccoz during his first lecture at Collège de France. As explained in the first article of this volume, this program aims to show the abundance of dynamics displaying a nonuniformly hyperbolic attractor. It proposes a topological and combinatorial definition of such mappings using the formalism of puzzle pieces.

READERSHIP: Graduate students and research mathematicians.

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 10% discount from list.
Astérisque, Number 410, 2019; 180 pp.; softcover; ISBN: 978-2-85629-904-3; List US$75; AMS members US$60; Order code: AST/410
Local Regularity Properties of Almost- and Quasiminimal Sets with a Sliding Boundary Condition

Guy David, Université Paris-Sud, Orsay, France

The author generalizes known interior regularity results, and, in particular, he shows that the quasiminimal sets are locally Ahlfors-regular, rectifiable, and, sometimes, uniformly rectifiable; that these classes are stable under limits; and that for almost-minimal sets, the density of Hausdorff measure in balls centered on the boundary is almost nondecreasing.

READERSHIP: Graduate students and research mathematicians.

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

Asterisque, Number 411, 2019; 380 pp.; softcover; ISBN: 978-2-85629-906-7; List US$97; AMS members US$77.60; Order code: AST/411

AMS / MAA Press

Fourier Series, Fourier Transforms, and Function Spaces: A Second Course in Analysis

Tim Hsu, San José State University, San José, CA

Fourier Series, Fourier Transforms, and Function Spaces is designed as a textbook for a second course or capstone course in analysis for advanced undergraduate or beginning graduate students.

READERSHIP: Undergraduate and graduate students and researchers interested in analysis, differential equations, and applied math.


Hyperbolic Flows

Todd Fisher, Brigham Young University, Provo, UT, and Boris Hasselblatt, Tufts University, Medford, MA

This book presents the theory of flows from the topological, smooth, and measurable points of view. The first part introduces the general topological and ergodic theory of flows, and the second part presents the core theory of hyperbolic flows as well as a range of recent developments.

READERSHIP: Students and researchers interested in dynamical systems.


Applications

AMS / MAA Press

Mathematical Interest Theory

Third Edition

Leslie Jane Federer Vaaler, Shinko Kojima Harper, The University of Texas at Austin, TX, and James W. Daniel

Mathematical Interest Theory provides an introduction to how investments grow over time, in a mathematically precise manner. The emphasis is on practical applications that give the reader a concrete understanding of why the various relationships should be true. Among the modern financial topics introduced are arbitrage, options, futures, and swaps.

READERSHIP: Undergraduate and graduate students interested in preparing for the Society of Actuaries (SOA) Financial Mathematics (FM) exam.

AMS/MAA Textbooks, Volume 57, 2019; 581 pp.; hardcover; ISBN: 978-1-4704-3590-1; List US$105; Institutional member US$84; Individual member US$78.75; MAA members US$78.75; Order code: TEXT/57

A Course in Cryptography

Heiko Knospe, Technische Hochschule Köln, University of Applied Sciences, Cologne, Germany

This compact course in modern cryptography presents the mathematical foundations in algebra, number theory, and probability with a focus on their cryptographic applications. The most relevant cryptographic schemes are covered, including block ciphers, stream ciphers, hash functions, message authentication codes, public-key encryption, key establishment, digital signatures, and elliptic curves. The current developments in post-quantum cryptography are also explored, with separate chapters on quantum computing, and lattice-based and code-based cryptosystems.

READERSHIP: Undergraduate students interested in cryptography.


Differential Equations

AMS / MAA Press

Differential Geometry and Tanaka Theory

Differential System and Hypersurface Theory

Toshihiro Shoda, Saga University, Japan, and Kazuhiro Shibuya, Hiroshima University, Japan, Editors

In January 2011, the international conference Differential Geometry and Tanaka Theory—Differential System and Hypersurface Theory was held at the Research Institute for Mathematical Sciences (RIMS), Kyoto University, in honor of the sixtieth birthdays of Reiko Miyaoka and Keizo Yamaguchi.

READERSHIP: Researchers interested in differential geometry and Tanaka theory.


ORDER BY PHONE | 401-455-4000 (Worldwide) or 800-321-4267 (US & Canada)
Differential Equations: Techniques, Theory, and Applications
Barbara D. MacCluer, University of Virginia, Charlottesville, VA, Paul S. Bourdon, University of Virginia, Charlottesville, VA, and Thomas L. Kriete, University of Virginia, Charlottesville, VA

In this reader-friendly text intended for a one- or two-semester-long first course in differential equations, techniques, theory, and applications are given equal importance and are tied together by means of several unifying themes. Applications are chosen from a wide range of disciplines, from standard ones in physics and engineering to those in the life sciences, where mathematics is playing an increasingly important role. The exposition is exceptionally readable, rigorous yet conversational. Students will find it inviting and approachable. The text supports many different styles of pedagogy, from traditional lecture to a flipped classroom model. The availability of a computer algebra system is not assumed, but there are many opportunities to incorporate the use of one.

READERSHIP: Undergraduate students interested in differential equations.

2019; 874 pp.; hardcover; ISBN: 978-1-4704-4797-7; List US$125; AMS members US$93.75; MAA members US$112.50; Order code: MBK/125

Geometric Relativity
Dan A. Lee, CUNY Graduate Center and Queens College, New York, NY

Geometric Relativity is centered around the study of mass in general relativity using the techniques of geometric analysis. Specifically, it provides a comprehensive treatment of the positive mass theorem and closely related results, such as the Penrose inequality, drawing on a variety of tools used in this area of research, including minimal hypersurfaces, conformal geometry, inverse mean curvature flow, conformal flow, spinors and the Dirac operator, marginally outer trapped surfaces, and density theorems.

READERSHIP: Graduate students and researchers interested in nonlinear differential equations and, in particular, in mathematical aspects of general relativity.


Discrete Geometry and Isotropic Surfaces
François Jaulent, Laboratoire Jean Leray, Université de Nantes, France, Yann Rollin, Laboratoire Jean Leray, Université de Nantes, France, and Samuel Tapie, Laboratoire Jean Leray, Université de Nantes, France

The proofs are obtained using analogies with an infinite-dimensional moment map geometry due to Donaldson.

READERSHIP: Graduate students and research mathematicians.

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


General Interest

SMF 2018: Congrès de la Société Mathématique de France
Emmanuel Breuillard, University of Cambridge, United Kingdom, Editor

This volume contains the proceedings of the 2nd Congress of the French Mathematical Society (SMF), which took place in Lille in June 2018.

READERSHIP: Graduate students and research mathematicians.

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


Gösta Mittag-Leffler and Vito Volterra
40 Years of Correspondence
Frédéric Jaëck, Ecole Normale Supérieure, Paris, France, Laurent Mazliak, Université Pierre et Marie Curie, Paris, France, Emmanuel Breuillard, University of Cambridge, United Kingdom, and Rosanna Tazzioli, Université Lille 1, Villeneuve-d’Ascq, France, Editors

Volterra and Mittag-Leffler’s exchanges illustrate how general analysis, especially functional analysis, gained a dramatic momentum during those years and how Volterra became one of the major leaders of the field, opening the path for several fundamental developments over the following decades. Through the letters, the reader can follow the institutional career and scientific activity of both Volterra and Mittag-Leffler, who shared many details about their lives.

READERSHIP: Mathematicians and non-mathematicians interested in the history of mathematics.

A publication of the European Mathematical Society (EMS). Distributed within the Americas by the American Mathematical Society.


Fundamentals of Graph Theory
Allan Bickle, Pennsylvania State University Altoona, PA

The goal of this textbook is to present the fundamentals of graph theory to a wide range of readers. The book contains many significant recent results in graph theory presented using up-to-date notation. The author included the shortest, most elegant, most intuitive proofs for modern and classic results while frequently presenting them in new ways.

READERSHIP: Undergraduate and graduate students interested in graph theory.

What’s Happening in the Mathematical Sciences, Volume 11
Dana Mackenzie
This new volume of What’s Happening in the Mathematical Sciences features a rich selection of articles about recent topics in pure and applied mathematics.

READERSHIP: General college and university audience, anyone interested in expository accounts of recent developments in mathematics.

AMS Page a Day Calendar
Evelyn Lamb, Freelance writer, Salt Lake City, UT
The AMS Page a Day Calendar is a collection of 366 mathematical morsels. Each day features a fun math fact, a tidbit of math history, a piece of art made using mathematics, a mathematical puzzle or activity, or another mathematical delight.

Living Proof: Stories of Resilience Along the Mathematical Journey
Allison K. Henrich, Seattle University, WA, Emille D. Lawrence, University of San Francisco, CA, Matthew A. Pons, North Central College, Naperville, IL, and David G. Taylor, Roanoke College, Salem, VA, Editors
Living Proof offers stories of perseverance by members of underrepresented groups when they faced barriers in the mathematics pipeline. Their persistence and strength took them through the challenges, and they have generously shared their stories in this book.

AMS / MAA Press
101 Careers in Mathematics
Fourth Edition
Deanna Hausnerger, Carleton College, Northfield, MN, and Robert Thompson, Carleton College, Northfield, MN, Editors
This book addresses the question What can you do with a degree in math? with 125 career profiles. With job titles ranging from sports analyst to science writer to inventory specialist to CEO, the volume provides ample evidence that one really can do nearly anything with a degree in mathematics.

READERSHIP: Undergraduate and graduate students interested in career possibilities in mathematics.

Geometry and Topology

Ouvres Mathématiques
Volume II
René Thom, Société Mathématique de France
This second volume of René Thom’s complete mathematical works contains the 1959 Bonn lectures on singularities and the articles published between 1962 and 1971, together with previously unpublished texts and comments, putting all into perspective.

READERSHIP: Graduate students and research mathematicians.
Discrete Morse Theory
Nicholas A. Scoville, Ursinus College, Collegeville, PA

Discrete Morse theory is a powerful tool combining ideas in both topology and combinatorics. Invented by Robin Forman in the mid-1990s, discrete Morse theory is a combinatorial analogue of Marston Morse’s classical Morse theory. Its applications are vast, including applications to topological data analysis, combinatorics, and computer science.

READERSHIP: Undergraduate and graduate students interested in discrete Morse theory.


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Logic and Foundations

A First Journey through Logic
Martin Hils, Westfälische Wilhelms-Universität Münster, Germany, and François Loeser, Sorbonne Université, Paris, France

Starting with a presentation of naive set theory and subsequently presenting other main areas of mathematical logic, this book aims to present mathematical logic to students and treat it on an equal footing to any other topic in the mathematical curriculum. Each chapter includes several interesting highlights—outside of logic when possible—even in the main text or as exercises or appendices.

READERSHIP: Undergraduate and graduate students and researchers interested in learning the basics of mathematical logic.


AMS / MAA Press
Math Education

Ying and the Magic Turtle
Sue Looney, Looney Math Consulting

This book is perhaps best experienced with someone as a read-aloud or read-together. Readers will learn of Ying’s trouble and root for her to find her solution. They will find themselves drawn not only into the life problems that Ying is facing but also into the inherent mathematics of the story.

READERSHIP: Children ages 5 and up, parents, and teachers can enjoy the book for its rich beauty in mathematics and as an ancient legend.

A publication of Delta Stream Media, an imprint of Natural Math. Distributed in North America by the American Mathematical Society.


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Topology Through Inquiry
Michael Starbird, University of Texas at Austin, TX, and Francis Su, Harvey Mudd College, Claremont, CA

Topology Through Inquiry is a comprehensive introduction to point-set, algebraic, and geometric topology, designed to support inquiry-based learning (IBL) courses for upper-division undergraduate or beginning graduate students. The book presents an enormous amount of topology, allowing an instructor to choose which topics to treat.

READERSHIP: Undergraduate and graduate students interested in topology and Inquiry Based Learning (IBL).


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A Cornucopia of Quadrilaterals
Claudi Alsina, Universitat Politècnica de Catalunya, Barcelona, Spain, and Roger B. Nelson, Lewis & Clark College, Portland, OR

A Cornucopia of Quadrilaterals collects and organizes hundreds of beautiful and surprising results about four-sided figures. There are results dating back to Euclid: the side-lengths of a pentagon, a hexagon, and a decagon inscribed in a circle can be assembled into a right triangle (the proof uses a quadrilateral and circumscribing circle); and results dating to Erdős: from any point in a triangle the sum of the distances to the vertices is at least twice as large as the sum of the distances to the sides.

READERSHIP: Undergraduate and graduate students interested in geometry.

Number Theory Revealed: An Introduction
Titu Andreescu, University of Texas at Dallas, TX, and Marius Stanean, Science consultant with INDECO Software

This book features selected techniques in the field. Each problem has at least one complete solution, and many problems have multiple solutions, useful in developing the necessary array of mathematical machinery for competitions.

READERSHIP: This book is not only for students preparing for mathematics Olympiads but also for undergraduate students and teachers.

A publication of XYZ Press. Distributed in North America by the American Mathematical Society.


Topics in Functional Equations
Third Edition
Titu Andreescu, University of Texas at Dallas, TX, Iurie Boreico, Stanford University, CA, Oleg Mushkarov, Bulgaria Academy of Science, Sofia, Bulgaria, and Nikolai Nikolov, Bulgaria Academy of Science, Sofia, Bulgaria

Anyone involved in math Olympiads, either in the U.S. or across the world, needs to have a firm grounding in functional equations as they begin to appear more frequently in these contests. This book is a systematic and comprehensive approach to functional equations as a whole.

READERSHIP: Middle and high school students interested in mathematics competition preparation.

A publication of XYZ Press. Distributed in North America by the American Mathematical Society.

XYZ Series, Volume 36, 2019; 505 pp.; hardcover; ISBN: 978-0-9993428-6-2; List US$59.95; AMS members US$47.96; Order code: XYZ/36

AMS / MAA Press
A Mathematician's Practical Guide to Mentoring Undergraduate Research
Michael Dorff, Brigham Young University, Provo, UT, Allison Henrich, Seattle University, WA, and Lara Pulwoll, Valparaiso University, IN

A Mathematician’s Practical Guide to Mentoring Undergraduate Research is a complete how-to manual on starting an undergraduate research program. Readers will find advice on setting appropriate problems, directing student progress, managing group dynamics, obtaining external funding, publishing student results, and a myriad of other relevant issues.

READERSHIP: Researchers interested in supervising undergraduate research.


Probability and Statistics

Stochastic Games and Related Concepts
T. Parthasarathy, Chennai Mathematical Institute and Indian Statistical Institute, Chennai, and Sujatha Babu, Chennai Mathematical Institute, India

This set of lecture notes is based on a series of ten lectures given by T. Parthasarathy at the Chennai Mathematical Institute. Topics in matrix and bimatrix games, stochastic games (finite, infinite, and undiscounted), and cooperative games are covered.

READERSHIP: Graduate students interested in probability and statistics.

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