Mathematics

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Email: patna@orientblackswan.com

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Contents

ALGEBRA

Abstract Algebra

AMS

Ronald Solomon
Ohio State University, Columbus, USA

At the heart of the text is a semi-historical journey through the early decades of the subject as it emerged in the revolutionary work of Euler, Lagrange, Gauss, and Galois. Avoiding excessive abstraction whenever possible, the text focuses on the central problem of studying the solutions of polynomial equations. Highlights include a proof of the Fundamental Theorem of Algebra, essentially due to Euler, and a proof of the constructability of the regular 17-gon, in the manner of Gauss. Another novel feature is the introduction of groups through a meditation on the meaning of congruence in the work of Euclid. *Everywhere in the text, the goal is to make clear the links connecting abstract algebra to Euclidean geometry, high school algebra, and trigonometry. Another goal is to encourage students, insofar as possible in a textbook format, to build the course for themselves, with exercises integrally embedded in the text of each chapter.*

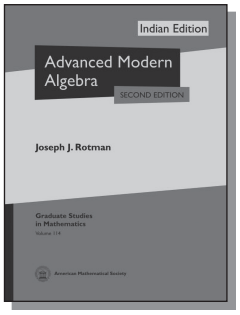
Contents: Geometry ◆ What Is Congruence? ◆ Some Two-Dimensional Geometry ◆ Symmetry ◆ Polynomials ◆ The Root of It All ◆ The Renaissance of Algebra ◆ Complex Numbers ◆ Symmetric Polynomials and The Fundamental Theorem of Algebra ◆ Permutations and Lagrange's Theorem ◆ Orbits and Cauchy's Formula ◆ Hamilton's Quaternion (Optional) ◆ Numbers ◆ Back to Euclid; Euclid's Lemma for Polynomials; Fermat and the Rebirth of Number Theory ◆ Lagrange's Theorem Revisited; Rings and Squares ◆ More Rings and More Squares ◆ Fermat's Last Theorem (for Polynomials) ◆ Still more Fermat's Last Theorem (Optional) ◆ The Grand Synthesis ◆ Constructible Polygons and the Method of Mr Gauss ◆ Cyclotomic Fields and Linear Algebra ◆ Lagrange Theorem for Fields and Nonconstructibility ◆ Galois Fields and the Fundamental Theorem of Algebra Revisited ◆ Galois' Theory of Equations ◆ The Galois Correspondence ◆ Constructible Numbers and Solvable Equations

2010 **240 pp** **Paperback**
978-0-8218-5210-1 **₹ 1075.00**

Advanced Modern Algebra (Second Edition)

AMS

Joseph J Rotman
University of Illinois at Urbana-Champaign, USA



This book is designed as a text for the first year of graduate algebra, but it can also serve as a reference since it contains more advanced topics as well. This second edition has a different organization than the first. It begins with a discussion of the cubic and quartic equations, which leads into permutations, group theory, and Galois theory (for finite extensions; infinite Galois theory is discussed later in the book). The study of groups continues with finite abelian groups (finitely generated groups are discussed later, in the context of module theory), Sylow theorems, simplicity of projective unimodular groups, free groups and presentations, and the Nielsen–Schreier theorem (subgroups of free groups are free).

The study of commutative rings continues with prime and maximal ideals, unique factorization, noetherian rings, Zorn's lemma and applications, varieties, and Gröbner bases. Next, noncommutative rings and modules are discussed, treating tensor product, projective, injective, and flat modules, categories, functors, and natural transformations, categorical constructions (including direct and inverse limits), and adjoint functors. Then follow group representations: Wedderburn–Artin theorems, character theory,

theorems of Burnside and Frobenius, division rings, Brauer groups, and abelian categories. Advanced linear algebra treats canonical forms for matrices and the structure of modules over PIDs, followed by multilinear algebra.

Homology is introduced, first for simplicial complexes, then as derived functors, with applications to Ext, Tor, and cohomology of groups, crossed products, and an introduction to algebraic K-theory. Finally, the author treats localization, Dedekind rings and algebraic number theory, and homological dimensions. The book ends with the proof that regular local rings have unique factorization.

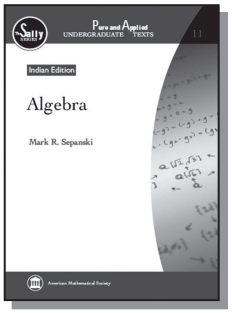
Contents: *Preface to Second Edition* ◆ *Special Notation* ◆ Groups I ◆ Classical Formulas ◆ Permutations ◆ Groups ◆ Lagrange's Theorem ◆ Homomorphisms ◆ Quotient Groups ◆ Group Actions ◆ Counting ◆ Commutative Rings I ◆ First Properties ◆ Polynomials ◆ Homomorphisms ◆ From Arithmetic to Polynomials ◆ Irreducibility ◆ Euclidean Rings and Principal Ideal Domains ◆ Vector Spaces ◆ Linear Transformations and Matrices ◆ Quotient Rings and Finite Fields ◆ Galois Theory ◆ Insolvability of the Quintic ◆ Classical Formulas and Solvability by Radicals ◆ Translation into Group Theory ◆ Fundamental Theorem of Galois Theory ◆ Calculations of Galois Groups ◆ Groups II ◆ Finite Abelian Groups ◆ Direct Sums ◆ Basis Theorem ◆ Fundamental Theorem ◆ Sylow Theorems ◆ Solvable Groups ◆ Projective Unimodular Groups ◆ Free Groups and Presentations ◆ Nielsen–Schreier Theorem ◆ Commutative Rings II ◆ Prime Ideals and Maximal Ideals ◆ Unique Factorization Domains ◆ Noetherian Rings ◆ Zorn's Lemma and Applications ◆ Zorn's Lemma ◆ Vector Spaces ◆ Algebraic Closure ◆ L uroth's Theorem ◆ Transcendence ◆ Separability ◆ Varieties ◆ Varieties and Ideals ◆ Nullstellensatz ◆ Irreducible Varieties ◆ Primary Decomposition ◆ Algorithms in k[x, . ., xn] ◆ Monomial Orders ◆ Division Algorithm ◆ Gr obner Bases ◆ Buchberger's Algorithm ◆ Rings ◆ Modules ◆ Categories ◆ Functors ◆ Free and Projective Modules

2014	1024 pp	Paperback
978–1–4704–1916–5		₹ 2,810.00

Algebra

AMS

Mark R Sepanski
Baylor University, Waco, USA



This is a readable introduction to the delightful world of modern algebra. Beginning with concrete examples from the study of integers and modular arithmetic, the text steadily familiarizes the reader with greater levels of abstraction as it moves through the study of groups, rings, and fields. The book is equipped with over 750 exercises suitable for many levels of student ability. There are standard problems, as well as challenging exercises, that introduce students to topics not normally covered in a first course. Difficult problems are broken into manageable subproblems and come equipped with hints when needed.

Appropriate for both self-study and the classroom, the material is efficiently arranged so that milestones such as the Sylow theorems and Galois theory can be reached in one semester.

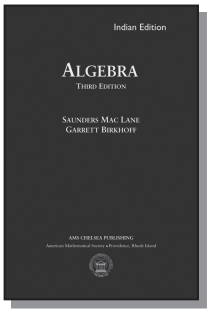
Contents: *Preface* ◆ Arithmetic: Integers Modular Arithmetic Groups: Definitions and Examples ◆ Basic Properties and Order ◆ Subgroups and Direct Products ◆ Morphisms ◆ Quotients ◆ Fundamental Theorem of Finite Abelian Groups ◆ The Symmetric ◆ Group ◆ Group Actions ◆ Sylow Theorems Simple Groups and Composition Series ◆ Rings: Examples and Basic Properties ◆ Morphisms and Quotients ◆ Polynomials and Roots ◆ Polynomials and Irreducibility ◆ Factorization ◆ Principal Ideal and Euclidean Domains ◆ Field Theory: Finite and Algebraic Extensions Splitting Fields ◆ Finite Fields ◆ Galois Theory Famous Impossibilities Cyclotomic Fields ◆ *Index*

2013	272 pp	Paperback
978–1–4704–0911–1		₹ 1,395.00

Algebra
(Third Edition)

AMS

Saunders Mac Lane & Garrett Birkhoff



This book presents modern algebra from first principles and is accessible to undergraduates or graduates. It combines standard materials and necessary algebraic manipulations with general concepts that clarify meaning and importance.

This conceptual approach to algebra starts with a description of algebraic structures by means of axioms chosen to suit the examples, for instance, axioms for groups, rings, fields, lattices, and vector spaces. This axiomatic approach--emphasized by Hilbert and developed in Germany by Noether, Artin, Van der Waerden, et al., in the 1920s--was popularized for the graduate level in the 1940s and 1950s to some degree by the authors' publication of *A Survey of Modern Algebra*. The present book presents the developments from that time to the first printing of this book. This third edition includes corrections made by the authors.

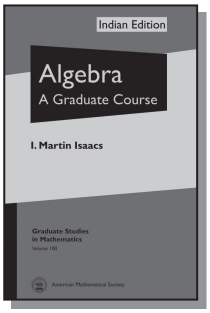
Contents: Sets, functions, and integers ◆ Groups ◆ Rings ◆ Universal constructions ◆ Modules ◆ Vector spaces ◆ Matrices ◆ Special fields ◆ Determinants and tensor products ◆ Bilinear and quadratic forms ◆ Similar matrices and finite abelian groups ◆ Structure of groups ◆ Galois theory ◆ Lattices ◆ Categories and adjoint functors ◆ Multilinear algebra ◆ *Appendix: Affine and projective spaces* ◆ *Bibliography* ◆ *Index*

2013	648 pp	Paperback
978-1-4704-0933-3		₹ 1,885.00

Algebra: A Graduate Course

AMS

I Martin Isaacs
Professor of Mathematics, University of Wisconsin, Madison, USA



This book, contains more than enough material for a two-semester graduate-level abstract algebra course, including groups, rings and modules, fields and Galois theory, an introduction to algebraic number theory, and the rudiments of algebraic geometry. *This book could be used for self study as well as for a course text*, and so full details of almost all proofs are included. There are hundreds of problems, many being far from trivial.

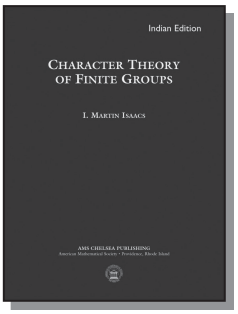
Contents: *Part One:* Non Commutative Algebra ◆ Definitions and Examples of Groups ◆ Subgroups and Cosets ◆ Homomorphisms ◆ Group Actions ◆ The Sylow Theorems and p-groups ◆ Permutation Groups ◆ New Groups from Old ◆ Solvable and Nilpotent Groups ◆ Transfer ◆ Operator Groups and Unique Decompositions ◆ Module Theory without Rings ◆ Rings, Ideals, and Modules ◆ Simple Modules and Primitive Rings ◆ Artinian Rings and Projective Modules ◆ An Introduction to Character Theory ◆ *Part Two:* Commutative Algebra ◆ Polynomial Rings, PIDs, and UFDs ◆ Field Extensions ◆ Galosis Theory ◆ Separability and Inseparability ◆ Cyclotomy and Geometric Constructions ◆ Finite Fields ◆ Roots, Radicals, and Real Numbers ◆ Norms, Traces, and Discriminants ◆ Transcendental Extensions ◆ The Artin-Schreier Theorem ◆ Ideal Theory ◆ Noetherian Rings ◆ Integrality ◆ Dedekind Domains ◆ Algebraic Sets and the Nullstellensatz

2010	528 pp	Paperback
978-0-8218-5214-9		₹ 1,845.00

Character Theory of Finite Groups

AMS

I Martin Isaacs
Professor of Mathematics, University of Wisconsin, Madison, USA



This volume contains a collection of papers from the Conference on Character Theory of Finite Groups, held at the Universitat de València, Spain, on June 3–5, 2009, in honor of I. Martin Isaacs.

The topics include permutation groups, character theory, p-groups, and group rings. The research articles feature new results on large normal abelian subgroups of p-groups, construction of certain wreath products, computing idempotents in group algebras of finite groups, and using dual pairs to study representations of cross characteristic in classical groups. The expository articles present results on vertex subgroups, measuring theorems in permutation groups, the development of super character theory, and open problems in character theory.

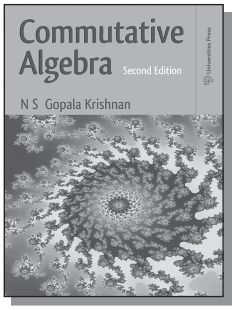
Contents: Algebras, modules, and representations ◆ Group representations and characters ◆ Characters and integrality ◆ Products of characters Induced characters ◆ Normal subgroups T.I. sets and exceptional characters ◆ Brauer's theorem ◆ Changing the field ◆ The Schur index ◆ Projective representations ◆ Character degrees ◆ Character correspondence ◆ Linear groups ◆ Changing the characteristic ◆ Some character tables ◆ *Bibliographic notes* ◆ *References* ◆ *Index*

2012	**320 pp**	**Paperback**
978-0-8218-8707-3		**₹ 1,270.00**

Commutative Algebra (Second Edition)

PRINT ON DEMAND

N S Gopala Krishnan
Formerly Faculty Member, Department of Mathematics, University of Pune, India



This textbook on commutative algebra presents basic results necessary for elementary algebraic geometry and introduces basic homological algebra and homological methods in commutative algebra. Its lecture-notes style will help readers with some mathematical maturity to study it on their own. Motivations are given at a number of places, examples follow every definition, and exercises are given at the end of each section.

Contents: *Preface* ◆ Modules ◆ Localisation ◆ Noetherian Rings ◆ Integral Extensions ◆ Dedekind Domains ◆ Completions ◆ Homology ◆ Dimension ◆ Regular Local Rings ◆ Some Conjectures

2015	**276 pp**	**Paperback**
978-81-7371-978-3		**₹ 750**

Concepts in Abstract Algebra

AMS

Charles Lanski
University of Southern California, Los Angeles, USA

The style and structure of *Concepts in Abstract Algebra* are designed to help students learn the core concepts and associated techniques in algebra deeply and well. The book presents interesting examples of sufficient complexity so that students can see the concepts and results used in a nontrivial setting. Charles Lanski gives students the opportunity to practice by offering many exercises that require the use and synthesis of the techniques and results. Both readable and

mathematically interesting, the text also helps students learn the art of constructing mathematical arguments.

2010	560 pp	Paperback
978-0-8218-5212-5		₹ 1,900.00

Course in Algebra, A

AMS

E B Vinberg
Moscow State University, Russia

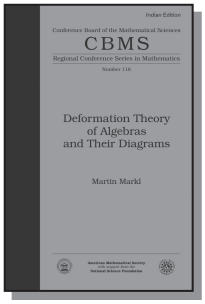
This is a comprehensive textbook on modern algebra written by an internationally renowned specialist. It covers material traditionally found in advanced undergraduate and basic graduate courses and presents it in a lucid style. The author includes almost no technically difficult proofs, and reflecting his point of view on mathematics, he tries wherever possible to replace calculations and difficult deductions with conceptual proofs and to associate geometric images to algebraic objects. *The effort spent on the part of students in absorbing these ideas will pay off when they turn to solving problems outside of this textbook.* Another important feature is the presentation of most topics on several levels, allowing students to move smoothly from initial acquaintance with the subject to thorough study and a deeper understanding. Basic topics are included, such as algebraic structures, linear algebra, polynomials, and groups, as well as more advanced topics, such as affine and projective spaces, tensor algebra, Galois theory, Lie groups, and associative algebras and their representations. Some applications of linear algebra and group theory to physics are discussed. The book is written with extreme care and *contains over 200 exercises and 70 figures. It is ideal as a textbook and also suitable for independent study for advanced undergraduates and graduate students.*

2009	528 pp	Paperback
978-0-8218-4858-6		₹ 2,025.00

Deformation Theory of Algebras and Their Diagrams

AMS

Martin Markl
Academy of Sciences of the Czech Republic, Praha, Czech Republic



This book brings together both the classical and current aspects of deformation theory. The presentation is mostly self-contained, assuming only basic knowledge of commutative algebra, homological algebra and category theory. In the interest of readability, some technically complicated proofs have been omitted when a suitable reference was available. The relation between the uniform continuity of algebraic maps and topologized tensor products is explained in detail, however, as this subject does not seem to be commonly known and the literature is scarce.

The exposition begins by recalling Gerstenhaber's classical theory for associative algebras. The focus then shifts to a homotopy-invariant setup of Maurer–Cartan moduli spaces. As an application, Kontsevich's approach to deformation quantization of Poisson manifolds is reviewed. Then, after a brief introduction to operads, a strongly homotopy Lie algebra governing deformations of (diagrams of) algebras of a given type is described, followed by examples and generalisations.

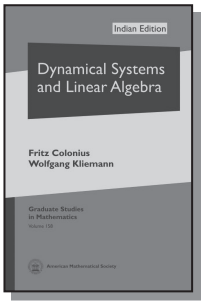
2017	144 pp	Paperback
978-1-4704-3723-7		₹ 1,185.00

Dynamical Systems and Linear Algebra

AMS

Fritz Colonius
Universität Augsburg, Augsburg, Germany

Wolfgang Kliemann
Iowa State University, Ames, IA



This book provides an introduction to the interplay between linear algebra and dynamical systems in continuous time and in discrete time. It first reviews the d autonomous case for one matrix A via induced dynamical systems in R and on Grassmannian manifolds. Then the main non-autonomous approaches are presented for which the time dependency of A(t) is given via skew-product flows using periodicity, or topological (chain recurrence) or ergodic properties (invariant measures). The authors develop generalisations of (real parts of) eigenvalues and eigenspaces as a starting point for a linear algebra for classes of time-varying linear systems, namely periodic, random, and perturbed (or controlled) systems.

The book presents for the first time in one volume a unified approach via Lyapunov exponents to detailed proofs of Floquet theory, of the properties of the Morse spectrum and of the multiplicative ergodic theorem for products of random matrices. The main tools, chain recurrence and Morse decompositions, as well as classical ergodic theory are introduced in a way that makes the entire material accessible for beginning graduate students.

2017 **304 pp** **Paperback**
978–1–4704–3729–9 **₹1,690.00**

Endoscopic Classification of Representations Orthogonal and Symplectic Groups, The

James Arthur
AMS
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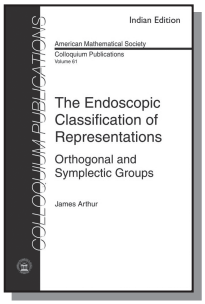


Within the Langlands program, endoscopy is a fundamental process for relating automorphic representations of one group with those of another. In this book, Arthur establishes an endoscopic classification of automorphic representations of orthogonal and symplectic groups G. The representations are shown to occur in families (known as global L-packets and A-packets), which are parametrised by certain self-dual automorphic representations of an associated general linear group GL(N). The central result is a simple and explicit formula for the multiplicity in the automorphic discrete spectrum of G for any representation in a family.

The results of the volume have already had significant applications: to the local Langlands correspondence, the construction of unitary representations, the existence of Whittaker models, the analytic behaviour of Langlands L-functions, the spectral theory of certain locally symmetric spaces, and to new phenomena for symplectic epsilon-factors. One can expect many more. In fact, it is likely that both the results and the techniques of the volume will have applications to almost all sides of the Langlands program.

The methods are by comparison of the trace formula of G with its stabilisation (and a comparison of the twisted trace formula of GL(N) with its stabilisation, which is part of work in progress by Moeglin and Waldspurger). This approach is quite different from methods that are based on L-functions, converse theorems, or the theta correspondence. The comparison of trace formulae in the volume ought to be applicable to

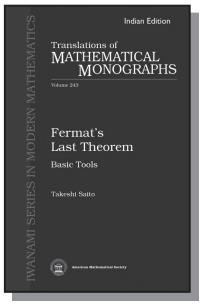
a much larger class of groups. Any extension at all will have further important implications for the Langlands program.

2017	612 pp	Paperback
978–1–4704–3837–1		₹ 2,100.00

Fermat's Last Theorem: Basic Tools

AMS

Takeshi Saito
University of Tokyo, Tokyo, Japan



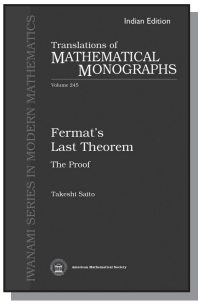
This book, together with the companion volume, Fermat'sLast Theorem: The proof, presents in full detail the proof of Fermat's Last Theorem given by Wiles and Taylor. With these two books, the reader will be able to see the whole picture of the proof to appreciate one of the deepest achievements in the history of mathematics. Crucial arguments, including the so-called 3–5 trick, R = T theorem, etc., are explained in depth. The proof relies on basic background materials in number theory and arithmetic geometry, such as elliptic curves, modular forms, Galois representations, deformation rings, modular curves over the integer rings, Galois cohomology, etc. The first four topics are crucial for the proof of Fermat's Last Theorem; they are also very important as tools in studying various other problems in modern algebraic number theory. The remaining topics will be treated in the second book to be published in the same series in 2014. In order to facilitate understanding the intricate proof, an outline of the whole argument is described in the first preliminary chapter, and more details are summarised in later chapters.

2017	216 pp	Paperback
978–1–4704–3840–1		₹ 1,370.00

Fermat's Last Theorem: The Proof

AMS

Takeshi Saito
University of Tokyo, Tokyo, Japan



This is the second volume of the book on the proof of Fermat's Last Theorem by Wiles and Taylor (the first volume is published in the same series; see MMONO/243). Here the detail of the proof announced in the first volume is fully exposed. The book also includes basic materials and constructions in number theory and arithmetic geometry that are used in the proof.

In the first volume the modularity lifting theorem on Galois representations has been reduced to properties of the deformation rings and the Hecke modules. The Hecke modules and the Selmer groups used to study deformation rings are constructed, and the required properties are established to complete the proof.

The reader can learn basics on the integral models of modular curves and their reductions modulo p that lay the foundation of the construction of the Galois representations associated with modular forms. More background materials, including Galois cohomology, curves over integer rings, the Néron models of their Jacobians, and so on., are also explained in the text and in the appendices.

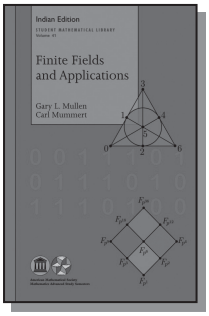
2017	240 pp	Paperback
978–1–4704–3841–8		₹ 1,440.00

Finite Fields and Applications

AMS

Gary L Mullen
Pennsylvania State University, University Park, USA

Carl Mummert
University of Michigan, Ann Arbor, USA



This book provides a brief and accessible introduction to the theory of finite fields and to some of their many fascinating and practical applications.

The first chapter is devoted to the theory of finite fields. After covering their construction and elementary properties, the authors discuss the trace and norm functions, bases for finite fields, and properties of polynomials over finite fields.

Each of the remaining chapters details applications. *Chapter 2* deals with combinatorial topics such as the construction of sets of orthogonal latin squares, affine and projective planes, block designs, and Hadamard matrices. *Chapters 3 and 4* provide a number of constructions and basic properties of error-correcting codes and cryptographic systems using finite fields.

Each chapter includes a set of exercises of varying levels of difficulty which help to further explain and motivate the material. *Appendix A* provides a brief review of the basic number theory and abstract algebra used in the text, as well as exercises related to this material. *Appendix B* provides hints and partial solutions for many of the exercises in each chapter. *A list of 64 references to further reading and to additional topics related to the book's material is also included.*

Intended for advanced undergraduate students, it is suitable both for classroom use and for individual study.

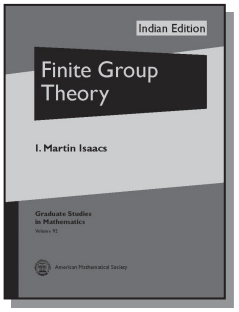
Contents: Finite fields ◆ Combinatorics ◆ Algebraic coding theory ◆ Cryptography ◆ Background in number theory and abstract algebra ◆ Hints for selected exercises ◆ *References* ◆ *Index*

2012	**192 pp**	**Paperback**
978-0-8218-8732-5		**₹ 1,100.00**

Finite Group Theory

AMS

I Martin Isaacs
Professor of Mathematics, University of Wisconsin, Madison, USA



The text begins with a review of group actions and Sylow theory. It includes semidirect products, the Schur–Zassenhaus theorem, the theory of commutators, coprime actions on groups, transfer theory, Frobenius groups, primitive and multiply transitive permutation groups, the simplicity of the PSL groups, the generalized Fitting subgroup and also Thompson's J-subgroup and his normal p-complement theorem.

Topics that seldom (or never) appear in books are also covered. These include subnormality theory, a group-theoretic proof of Burnside's theorem about groups with order divisible by just two primes, the Wielandt automorphism tower theorem, Yoshida's transfer theorem, the "principal ideal theorem" of transfer theory and many smaller results that are not very well known.

Proofs often contain original ideas, and they are given in complete detail. In many cases they are simpler than can be found elsewhere. The book is largely based on the author's lectures, and consequently, the style is friendly and somewhat informal. Finally, the book includes a large collection of problems at disparate levels of difficulty. These should enable students to practice group theory and not just read about it.

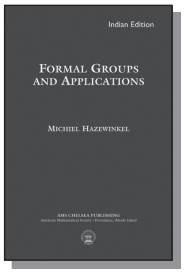
Contents: Sylow Theory ◆ Subnormality ◆ Split Extensions ◆ Commutators ◆ Transfer ◆ Frobenius Actions ◆ The Thompson Subgroup ◆ Permutation Groups ◆ More on Subnormality ◆ *Appendix: The Basics* ◆ *Index*

2011	**364 pp**	**Paperback**
978-0-8218-6884-3		**₹ 1,475.00**

Formal Groups and Applications

AMS

Michiel Hazewinkel



This book is a comprehensive treatment of the theory of formal groups and its numerous applications in several areas of mathematics. The seven chapters of the book present basics and main results of the theory, as well as very important applications in algebraic topology, number theory, and algebraic geometry. Each chapter ends with several pages of historical and bibliographic summary. One prerequisite for reading the book is an introductory graduate algebra course, including certain familiarity with category theory.

2017	**600 pp**	**Paperback**
978-1-4704-3835-7		**₹ 2,100.00**

Graduate Algebra: Commutative View

AMS

Louis Halle Rowen
Bar-Ilan University, Ramat Gan, Israel

This book is an expanded text for a graduate course in commutative algebra, focusing on the algebraic underpinnings of algebraic geometry and of number theory. Accordingly, the theory of affine algebras is featured, treated both directly and via the theory of Noetherian and Artinian modules, and the theory of graded algebras is included to provide the foundation for projective varieties. Major topics include the theory of modules over a principal ideal domain, and its applications to matrix theory (including the Jordan decomposition), the Galois theory of field extensions, transcendence degree, the prime spectrum of an algebra, localization, and the classical theory of Noetherian and Artinian rings. Later chapters include some algebraic theory of elliptic curves (featuring the Mordell-Weil theorem) and valuation theory, including local fields.

Contents: Introduction List of symbols Introduction and Prerequisites ◆ *Part I:* Modules ◆ Introduction to Modules and their Structure Theory ◆ Finitely Generated Modules ◆ Simple Modules and Composition Series ◆ *Part II*: Affine Algebras and Noetherian Rings ◆ Galois Theory of Fields ◆ Algebras and Affine Fields ◆ Transcendence Degree and the Krull Dimension of a Ring ◆ Modules and Rings Satisfying Chain Conditions ◆ Localization and the Prime Spectrum ◆ The Krull Dimension Theory of Commutative Noetherian Rings ◆ *Part III:* Applications to Geometry and Number Theory ◆ The Algebraic Foundations of Geometry ◆ Applications to Algebraic Geometry over the Rationals–Diophantine Equations and Elliptic Curves ◆ Absolute Values and Valuation Rings ◆ *List of major results* ◆ *Bibliography* ◆ *Index*

2010	**456 pp**	**Paperback**
978-0-8218-5220-0		**₹ 1,990.00**

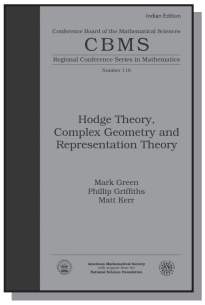
Hodge Theory, Complex Geometry and Representation Theory

AMS

Mark Green
University of California, Los Angeles, Los Angeles, CA

Phillip Griffiths
Institute of Advanced Study, Princeton, NJ

Matt Kerr
Washington University, St. Louis, MO



This monograph presents topics in Hodge theory and representation theory, two of the most active

and important areas in contemporary mathematics. The underlying theme is the use of complex geometry to understand the two subjects and their relationships to one another—an approach that is complementary to what is in the literature. Finite dimensional representation theory and complex geometry enter via the concept of Hodge representations and Hodge domains. Infinite-dimensional representation theory, specifically the discrete series and their limits, enters through the realisation of these representations through complex geometry as pioneered by Schmid, and in the subsequent description of automorphic cohomology. For the latter topic, of particular importance is the recent work of Carayol that potentially introduces a new perspective in arithmetic automorphic representation theory.

The present work gives a treatment of Carayol's work, and some extensions of it, set in a general complex geometric framework. Additional subjects include a description of the relationship between limiting mixed Hodge structures and the boundary orbit structure of Hodge domains, a general treatment of the correspondence spaces that are used to construct Penrose transforms and selected other topics from the recent literature.

2017	312 pp	Paperback
978–1–4704–3724–4		₹ 1,690.00

Introduction to Representation Theory

AMS

Pavel Etingof
Massachusetts Institute of Technology, Cambridge, USA

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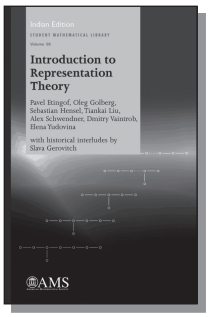
Sebastian Hensel
Universität Bonn, Germany

Tiankai Liu
Massachusetts Institute of Technology, Cambridge, USA

Alex Schwendner
Two Sigma Investments, New York, USA

Dmitry Vaintrob
Harvard University, Cambridge, USA

Elena Yudovina
University of Cambridge, UK



Very roughly speaking, representation theory studies symmetry in linear spaces. It is a beautiful mathematical subject which has many applications, ranging from number theory and combinatorics to geometry, probability theory, quantum mechanics, and quantum field theory.

The goal of this book is to give a "holistic" introduction to representation theory, presenting it as a unified subject which studies representations of associative algebras and treating the representation theories of groups, Lie algebras, and quivers as special cases. Using this approach, the book covers a number of standard topics in the representation theories of these structures. Theoretical material in the book is supplemented by many problems and exercises which touch upon a lot of additional topics; the more difficult exercises are provided with hints.

The book is designed as a textbook for advanced undergraduate and beginning graduate students. It should be accessible to students with a strong background in linear algebra and a basic knowledge of abstract algebra.

Contents: Introduction ◆ Basic notions of representation theory ◆ What is representation theory? ◆ Algebras ◆ Representations ◆ Ideals ◆ Quotients ◆ Algebras defined by generators and relations ◆ Examples of algebras ◆ Quivers ◆ Lie algebras ◆ Historical interlude: Sophus Lie's trials and transformations ◆ Tensor products ◆ The tensor algebra ◆ Hilbert's third problem ◆ Tensor products and duals of representations of Lie algebras ◆ Representations of sl(2)

2014	240 pp	Paperback
978–1–4704–1919–6		₹ 1,100.00

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India

Amber Habib
Shiv Nadar Institution of Eminence, Delhi NCR, India

Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India

See page 69

Linear Algebra
(Fourth Edition)

Werner Greub

This textbook gives a detailed and comprehensive presentation of the linear algebra based on axiomatic treatment of linear spaces. The author maintains a good balance between modern algebraic interests and traditional linear algebra. Several chapters have been substantially rewritten for clarity of exposition, although their basic content is unchanged. *A considerable number of exercises covering new material has also been added.*

2010 **492 pp** **Paperback**
978–81–8489–633–6 **₹ 1,165.00**

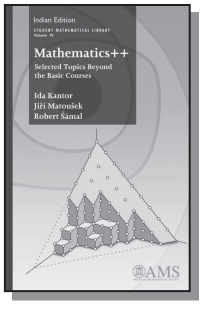
Mathematics++: Selected Topics Beyond the Basic Courses

AMS

Ida Kantor
Charles University, Prague, Czech Republic

Jirí Matoušek
Charles University, Prague, Czech Republic and ETH, Zurich, Switzerland

Robert Šámal
Charles University, Prague, Czech Republic



Mathematics++ is a concise introduction to six selected areas of 20th century mathematics providing numerous modern mathematical tools used in contemporary research in computer science, engineering and other fields. The areas are: measure theory, high-dimensional geometry, Fourier analysis, representations of groups, multivariate polynomials and topology. For each of the areas, the authors introduce basic notions, examples and results. The presentation is clear and accessible, stressing intuitive understanding and it includes carefully selected exercises as an integral part. Theory is complemented by applications – some quite surprising – in theoretical computer science and discrete mathematics. The chapters are independent of one another and can be studied in any order.

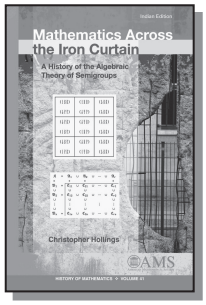
It is assumed that the reader has gone through the basic mathematics courses. Although the book was conceived while the authors were teaching Ph. D. students in theoretical computer science and discrete mathematics, it will be useful for a much wider audience, such as mathematicians specialising in other areas, mathematics students deciding what specialisation to pursue, or experts in engineering or other fields.

2017 **360 pp** **Paperback**
978–1–4704–3845–6 **₹ 1,770.00**

Mathematics Across the Iron Curtain: A History of Algebraic Theory of Semigroups

AMS

Christopher Hollings



The theory of semigroups is a relatively young branch of mathematics, with most of the major results having appeared after the Second World War. This book describes the evolution of (algebraic) semigroup theory from its earliest origins to the establishment of a full-fledged theory.

Semigroup theory might be termed 'Cold War mathematics' because of the time during which it developed. There were thriving schools on both sides of the Iron Curtain, although the two sides were not always able to communicate with each other, or even gain access to the other's publications. A major theme of this book is the comparison of the approaches to the subject of mathematicians in East and West, and the study of the extent to which contact between the two sides was possible.

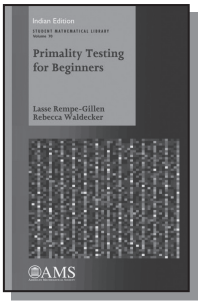
2017	456 pp	Paperback
978-1-4704-3732-9		₹1,935.00

Primality Testing for Beginners

AMS

Lasse Rempe-Gillen
University of Liverpool, Liverpool, United Kingdom

Rebecca Waldecker
Martin-Luther-Universität Halle-Wittenberg, Halle, Germany



How can you tell whether a number is prime? What if the number has hundreds or thousands of digits? This question may seem abstract or irrelevant, but in fact, primality tests are performed every time we make a secure online transaction. In 2002, Agrawal, Kayal and Saxena answered a long-standing open question in this context by presenting a deterministic test (the AKS algorithm) with polynomial running time that checks whether a number is prime or not. What is more, their methods are essentially elementary, providing us with a unique opportunity to give a complete explanation of a current mathematical breakthrough to a wide audience.

Rempe-Gillen and Waldecker introduce the aspects of number theory, algorithm theory and cryptography that are relevant for the AKS algorithm and explain in detail why and how this test works. This book is specifically designed to make the reader familiar with the background that is necessary to appreciate the AKS algorithm and begins at a level that is suitable for secondary school students, teachers and interested amateurs. Throughout the book, the reader becomes involved in the topic by means of numerous exercises.

2017	256 pp	Paperback
978-1-4704-3842-5		₹1,600.00

Representation Theory and Automorphic Forms

AMS

Paul J Sally, Jr (Ed.)
University of Chicago, USA

Nolan R Wallach (Ed.)

The eleven papers collected in this volume provide a glimpse at the historical development of a subject which has expanded into many areas of mathematics during the past forty years. In addition, this volume provides easy access to a useful set of references. Chronicling some of the most important developments by some of the field's major figures, this book will appeal to specialists in representation theory as well as to researchers in those areas of mathematics in which representation theory plays an important role.

Contents: On the characters of a semisimple Lie group ◆ Infinite-dimensional group representations ◆ Translation-invariant cones of functions on semi-simple Lie groups ◆ On the existence and irreducibility of certain series of representations ◆ The action of a real semisimple group on a complex flag manifold. I: Orbit structure and holomorphic arc components ◆ Harmonic analysis on semisimple Lie groups ◆ On the Selberg trace formula in the case of compact quotient ◆ Invariant differential equations on homogeneous manifolds ◆ On the role of the Heisenberg group in harmonic analysis ◆ Ergodic theory, group representations, and rigidity ◆ An elementary introduction to the Langlands program

2010	448 pp	Paperback
978-0-8218-5211-8		₹1,940.00

Representations of Finite and Compact Groups

AMS

Barry Simon
I B M Professor of Mathematics and Theoretical Physics, California Institute of Technology, Pasadena, USA

Barry Simon is the author of several books, including such classics as *Methods of Mathematical Physics* (with M. Reed) and *Functional Integration* and *Quantum Physics. This new book, based on courses given at Princeton, Caltech, ETH-Zurich, and other universities, is an introductory textbook on representation theory*. According to the author, "*Two facets distinguish my approach. First, this book is relatively elementary, and second, while the bulk of the books on the subject is written from the point of view of an algebraist or a geometer, this book is written with an analytical flavor*". The exposition in the book centres around the study of representation of certain concrete classes of groups, including permutation groups and compact semi-simple Lie groups. It culminates in the complete proof of the Weyl character formula for representations of compact Lie groups and the Frobenius formula for characters of permutation groups. Extremely well tailored, both for a one-year course in representation theory and for independent study, this book is an excellent introduction to the subject which, according to the author, is unique in having "so much innate beauty so close to the surface".

Contents: *Preface* ◆ Chapters VIII, VII, and III ◆ Fundamentals of group represetnations (Chapter 2) ◆ Introduction ◆ Groups and counting principles (Chapter I) ◆ Fundamentals of group representations (Chapter II) ◆ Abstract theory of representations of finite groups (Chapter III) ◆ Representations of concrete finite groups. I: Abelian and Clifford groups (Chapter IV) ◆ Representations of concrete finite groups. II: Semidirect products and induced representations (Chapter V) ◆ Concrete representations of finite groups. III: The symmetric groups (Chapter VI) ◆ Compact groups (Chapter VII) ◆ The structure of compact semisimple groups (Chapter VIII) ◆ The representations of compact semisimple groups (Chapter IX) ◆ *Multilinear algebra (Appendix A)* ◆ *The analysis of self-adjoint Hilbert-Schmidt operators (Appendix B)* ◆ *Bibliography* ◆ *Index*

2009	**280 pp**	**Paperback**
978-0-8218-4851-7		**₹1,360.00**

Tensor Categories

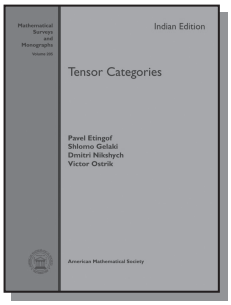
AMS

Pavel Etingof
Massachusetts Institute of Technology, Cambridge, MA

Shlomo Gelaki
Technion–Israel Institute of Technology, Haifa, Israel

Dmitri Nikshych
University of New Hampshire, Durham, NH

Victor Ostrik
University of Oregon, Eugene, OR



Is there a vector space whose dimension is the golden ratio? Of course not—the golden ratio is not an integer! But this can happen for generalisations of vector spaces—objects of a tensor category. The theory of tensor categories is a relatively new field of mathematics that generalises the theory of group representations. It has deep connections with many other fields, including representation theory, Hopf algebras, operator algebras, low dimensional topology (in particular, knot theory), homotopy theory, quantum mechanics and field theory, quantum computation, theory of motives, etc. This book gives a systematic introduction to this theory and a review of its applications. While giving a detailed overview of general tensor categories, it focuses especially on the theory of finite tensor categories and fusion categories (in particular, braided and modular ones), and discusses the main results about them with proofs. In particular, it shows how the main properties of finite-dimensional Hopf algebras may be derived from the theory of tensor categories.

Many important results are presented as a sequence of exercises, which makes the book valuable for students and suitable for graduate courses. Many applications, connections to other areas, additional results, and references are discussed at the end of each chapter.

2017	360 pp	Paperback
978-1-4704-3741-1		₹ 1,770.00

Topics in Abstract Algebra
REVISED EDITION

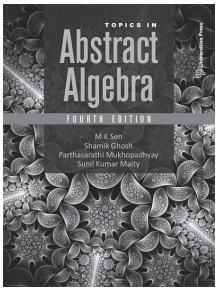
Fourth Edition

M K Sen
University of Calcutta, Kolkata, India

Shamik Ghosh
Jadavpur University, Jadavpur, India

Parthasarathi Mukhopadhyay
University of Calcutta, Kolkata, India

Sunil Kumar Maity
University of Calcutta, Kolkata, India



Online resources available

Replete with thought-provoking examples, worked-out exercises and a new section on Automorphism of Groups, this fourth edition of Topics in Abstract Algebra is designed in accordance with the new Choice Based Credit System (CBCS) syllabus of Abstract Algebra and Advanced Abstract Algebra prescribed by UGC for all Indian universities at the UG Honours/Advanced level. Students appearing for competitive entrance examinations such as NET, JAM, ISI, IISc., TIFR, NBHM, GATE, SET or MCA will benefit immensely from the carefully selected exercises that include MCQs added at the end of each section.

Well-supported by precisely laid-out online resources, the book also provides interesting insights to the history of mathematics to enable readers understand the concepts in the right perspective.

Online resources available at:
www.universitiespress.com/mksen/topicsinabstractalgebra

Contents: *About the Authors* ◆ *Preface to the Fourth Edition* ◆ *Preface to the First Edition* ◆ *Preliminaries* ◆ Integers ◆ Groups ◆ Permutation Groups ◆ Subgroups ◆ Homomorphisms of Groups ◆ Direct Product of Groups ◆ Symmetry ◆ Finite Abelian Groups ◆ Sylow Theorems ◆ Simple Groups ◆ Rings ◆ Ideals and Homomorphisms of Rings ◆ Factorization in Integer Domains ◆ Polynomial Rings ◆ *Appendices* ◆ *Bibliography* ◆ *Answers* ◆ *Index*

2022	536 pp	Paperback
978-93-933-302-46		₹ 675.00

Topics in Applied Abstract Algebra
AMS

S R Nagpaul
Ohio University, Athens, USA

S K Jain
Ohio University, Athens, USA

This book presents interesting applications of abstract algebra to practical real-world problems. The book is appropriate as *either a text for an applied abstract algebra course or as a supplemental text for a standard course in abstract algebra.* While fully developed, the algebraic theory presented is just what is required for the applications discussed in the book.

Contents: Preliminary Algebraic Concepts ◆ Boolean Algebras and Switching Circuits ◆ Balanced Incomplete Block Designs ◆ Algebraic Cryptography Coding ◆ Theory ◆ Symmetry Groups and Color Patterns ◆ Wallpaper Pattern Groups ◆ *Answers and Hints for Selected* ◆ *Exercises* ◆ *Index*

2010	336 pp	Paperback
978-0-8218-5213-2		₹ 1,630.00

Transformation Groups for Beginners

AMS

S V Duzhin
Steklov Institute of Mathematics, St. Petersburg, Russia

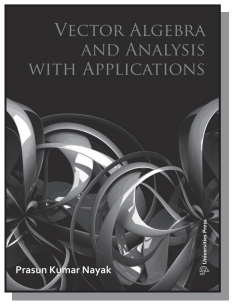
B D Chebotarevsky
Minsk, Belarus

The notion of symmetry is important in many disciplines, including physics, art, and music. The modern mathematical way of treating symmetry is through transformation groups. *This book offers an easy introduction to these ideas for the relative novice, such as undergraduates in mathematics or even advanced undergraduates in physics and chemistry*. The first two chapters provide a warm-up to the material with, for example, a discussion of algebraic operations on the points in the plane and rigid motions in the Euclidean plane. The notions of a transformation group and of an abstract group are then introduced. Group actions, orbits, and invariants are covered in the next chapter. The final chapter gives an elementary exposition of the basic ideas of Sophus Lie about symmetries of differential equations. *Throughout the text, examples are drawn from many different areas of mathematics. Plenty of figures are included, and many exercises with hints and solutions will help readers master the material.*

Contents: Introduction ◆ Algebra of points ◆ Plane movements ◆ Transformation groups ◆ Arbitrary groups ◆ Orbits and ornaments ◆ Other types of transformations ◆ Symmetries of differential equations ◆ *Answers, hints and solutions to exercises* ◆ *Index*

2011	**256 pp**	**Paperback**
978-0-8218-6890-4		**₹1,320.00**

Vector Algebra and Analysis with Applications



Online resources available

Prasun Kumar Nayak
Assistant Professor, Department of Mathematics (UG & PG), Midnapore College (Autonomous), Midnapore, India

Vector is one of the important concepts necessary for the study of Physics, Applied Mathematics and Engineering. This book presents the principal topics in the subject – scalars, vectors, vector algebra, vector differentiation and the differential operator, vector integration and integral theorems – in a clear and simple manner. For each topic, the definitions of important terms, properties and deductions are provided, along with worked-out examples and figures to ensure in-depth understanding and comprehension.

Salient Features: More than 220 figures supplement the text ◆ Over 330 worked-out examples are presented ◆ End-of-chapter exercises comprise 418 practical problems and 221 objective type questions (with answers wherever applicable) ◆ The book will also be useful to students preparing for competitive examinations like IIT JAM, NET, SET and GATE

Online resources available at:
www.universitiespress.com/pknayak/vaaa

Contents: Scalars and Vectors ◆ Scalar ◆ Vector ◆ Vector Algebra ◆ Components of a Vector ◆ Linear Combination of Vectors ◆ Section Ratio (Point of Division) ◆ Collinear and Coplanar Vectors ◆ Centroids ◆ *Exercises* ◆ Product of Vectors ◆ Scalar Product ◆ Applications to Cartesian Geometry ◆ Cross Product ◆ Vector Area ◆ Product of Three Vectors ◆ *Exercises* ◆ Applications of Vector Algebra ◆ Vector Equations ◆ Applications in Geometry ◆ Plane ◆ Sphere ◆ Volume of a Tetrahedron ◆ Applications in Mechanics ◆ *Exercises* ◆ Vector Differentiation ◆ Scalar and Vector Fields ◆ Vector Calculus ◆ Applications in Differential Geometry ◆ Curvilinear Coordinates ◆ Applications in Mechanics ◆ *Exercises* ◆ Vector Differential Operator ◆ Differential Operator ◆ Gradient ◆ Divergence ◆ Curl ◆ Laplacian Operator

◆ *Exercises* ◆ Vector Integration ◆ Definitions of Basic Concepts ◆ Ordinary Integral ◆ Line Integrals ◆ Surface Integrals ◆ Volume Integrals ◆ *Exercises* ◆ Integral Theorems ◆ Green's Theorem in the Plane ◆ Gauss's Divergence Theorem ◆ Stokes' Theorem ◆ *Exercises* ◆ *Bibliography* ◆ *Index*

2017	432 pp	Paperback
978-93-86235-15-2		₹ 775.00

Algebraic Geometry

Algebraic and Geometric Theory of Quadratic Forms, The

AMS

Richard Elman
Professor of Mathematics, University of California, Los Angeles, USA

Nikita Karpenko
Professor of Mathematics, Université Pierre et Marie Curie, Paris, France

Alexander Merkurjev
Professor of Mathematics, University of California, Los Angeles, USA

This book is a comprehensive study of the algebraic theory of quadratic forms, from classical theory to recent developments, including results and proofs that have never been published. The book is written from the viewpoint of algebraic geometry and includes the theory of quadratic forms over fields of characteristic two, with proofs that are characteristic independent whenever possible. For some results both classical and geometric proofs are given. *Part I* includes classical algebraic theory of quadratic and bilinear forms and answers many questions that have been raised in the early stages of the development of the theory. Assuming only a basic course in algebraic geometry, *Part II* presents the necessary additional topics from algebraic geometry including the theory of Chow groups, Chow motives, and Steenrod operations. These topics are used in *Part III* to develop a modern geometric theory of quadratic forms.

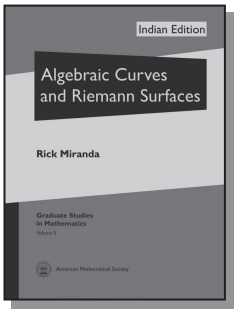
Contents: Introduction ◆ *Part 1:* Classical theory of symmetric bilinear forms and quadratic Forms: Bilinear Forms ◆ Quadratic Forms ◆ Forms over Rational Function Fields ◆ Function Fields of Quadrics ◆ Bilinear and Quadratic Forms and Algebraic Extensions ◆ U-invariants ◆ Applications of the Milnor Conjecture ◆ On the Norm Residue Homomorphism of Degree Two ◆ *Part 2:* Algebraic cycles: Homology and Cohomology ◆ Chow Groups ◆ Steenrod Operations ◆ Category of Chow Motives ◆ *Part 3:* Quadratic forms and algebraic cycles: Cycles on Powers of Quadrics ◆ The Izhboldin Dimension ◆ Application of Steenrod Operations ◆ The Variety of Maximal Totally Isotropic Subspaces ◆ Motives of Quadrics ◆ *Appendices* ◆ *Bibliography* ◆ *Notation* ◆ *Terminology*

2011	448 pp	Paperback
978-0-8218-6876-8		₹ 1,845.00

Algebraic Curves and Riemann Surfaces

AMS

Rick Miranda
Colorado State University, Ft. Collins, USA



In this book, Miranda takes the approach that algebraic curves are best encountered for the first time over the complex numbers, where the reader's classical intuition about surfaces, integration, and other concepts can be brought into play. Therefore, many examples of algebraic curves are presented in the first chapters. In this way, the book begins as a primer on Riemann surfaces, with complex charts and meromorphic functions taking center stage. But the main examples come from projective curves, and slowly but surely the text moves toward the algebraic category. Proofs of Riemann-Roch and Serre Duality Theorems are presented in an algebraic manner, via an adaptation of the adelic proof, expressed completely in terms of solving a Mittag–Leffler problem. Sheaves and cohomology are introduced as a unifying device in the latter chapters, so that their utility and naturalness are immediately obvious. Requiring a

background of one semester of complex variable theory and a year of abstract algebra, *this is an excellent graduate textbook for a second-semester course in complex variables or a year-long course in algebraic geometry.*

Contents: Riemann surfaces: Basic definitions ⋄ Functions and maps ⋄ More examples of Riemann surfaces ⋄ Integration on Riemann surfaces ⋄ Divisors and meromorphic functions ⋄ Algebraic curves and the Riemann-Roch theorem ⋄ Applications of Riemann-Roch ⋄ Abel's theorem ⋄ Sheaves and Čech cohomology ⋄ Algebraic sheaves ⋄ Invertible sheaves, line bundles, and H^1 ⋄ *References* ⋄ *Index of notation* ⋄ *Index of terminology*

2010	**416 pp**	**Paperback**
978-0-8218-5218-7		**₹ 1,615.00**

Algebraic Geometry: A Problem-solving Approach

AMS PRINT ON DEMAND

Thomas Garrity
Williams College, Williamstown, USA

Richard Belshoff
Missouri State University, Springfield, USA

Lynette Boos
Providence College, USA

Ryan Brown
Georgia College and State University, Milledgeville, USA

Carl Lienert
Fort Lewis College, Durango, USA

David Murphy
Hillsdale College, USA

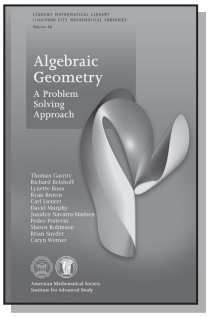
Junalyn Navarra-Madsen
Texas Woman's University, Denton, USA

Pedro Poitevin
Salem State University, USA

Shawn Robinson
Colorado Mesa University, Grand Junction, USA

Brian Snyder
Lake Superior State University, Sault Ste. Marie, USA

Caryn Werner
Allegheny College, Meadville, USA



Algebraic geometry has been at the centre of much of mathematics for hundreds of years. It is not an easy field to break into, despite its humble beginnings in the study of circles, ellipses, hyperbolas, and parabolas. This text consists of a series of exercises, plus some background information and explanations, starting with conics and ending with sheaves and cohomology. The first chapter on conics is appropriate for first-year college students (and many high school students). Chapter 2 leads the reader to an understanding of the basics of cubic curves, while chapter 3 introduces higher degree curves. Both chapters are appropriate for people who have taken multivariable calculus and linear algebra. Chapters 4 and 5 introduce geometric objects of higher dimension than curves. Abstract algebra now plays a critical role, making a first course in abstract algebra necessary from this point on. The last chapter is on sheaves and cohomology, providing a hint of current work in algebraic geometry.

Contents: *Preface* ⋄ *Algebraic Geometry* ⋄ *Overview* ⋄ *Problem Book* ⋄ *History of the Book* ⋄ *Other Texts* ⋄ *An Aside on Notation* ⋄ *Acknowledgments* ⋄ Chapter 1. Conics ⋄ Conics over the Reals ⋄ Changes of Coordinates ⋄ Conics over the Complex Numbers ⋄ The Complex Projective Plane P2 ⋄ Projective Changes of Coordinates ⋄ The Complex Projective Line P1 ⋄ Ellipses, Hyperbolas, and Parabolas as Spheres ⋄ Links to Number Theory ⋄ Degenerate Conics ⋄ Tangents and Singular Points ⋄ Conics via Linear Algebra ⋄ Duality ⋄ Chapter 2. Cubic Curves and Elliptic Curves ⋄ Cubics in C2 ⋄ Inflection Points ⋄ Group Law ⋄ Normal Forms of Cubics ⋄ The Group Law for a Smooth Cubic in Canonical Form ⋄ Cross-Ratios and the j-Invariant ⋄ Torus as C/Λ ⋄ Mapping C/Λ to a Cubic ⋄ Cubics as Tori ⋄ Chapter 3. Higher Degree Curves ⋄ Higher Degree Polynomials and Curves ⋄ Higher Degree Curves as Surfaces ⋄

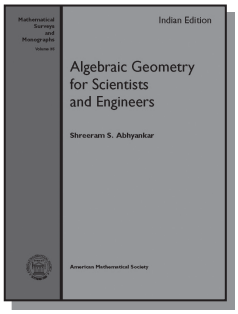
Bezout's Theorem ◆ The Ring of Regular Functions and Function Fields ◆ Divisors ◆ The Riemann-Roch Theorem ◆ Blowing Up ◆ Chapter 4. Affine Varieties ◆ Zero Sets of Polynomials ◆ Algebraic Sets and Ideals ◆ Hilbert Basis Theorem ◆ The Strong Nullstellensatz ◆ The Weak Nullstellensatz ◆ Points in Affine Space as Maximal Ideals ◆ Affine Varieties and Prime Ideals ◆ Regular Functions and the Coordinate Ring ◆ Subvarieties ◆ Function Fields ◆ The Zariski Topology ◆ Spec(R) ◆ Points and Local Rings ◆ Tangent Spaces ◆ Dimension ◆ Arithmetic Surfaces ◆ Singular Points ◆ Morphisms ◆ Isomorphisms of Varieties ◆ Rational Maps ◆ Products of Affine Varieties ◆ Chapter 5. Projective Varieties ◆ Definition of Projective Space ◆ Graded Rings and Homogeneous Ideals ◆ Projective Varieties ◆ Functions, Tangent Spaces, and Dimension ◆ Rational and Birational Maps ◆ Proj(R) ◆ Chapter 6. The Next Steps: Sheaves and Cohomology ◆ Intuition and Motivation for Sheaves ◆ The Definition of a Sheaf ◆ The Sheaf of Rational Functions ◆ Divisors ◆ Invertible Sheaves and Divisors ◆ Basic Homology Theory ◆ Cech Cohomology ◆ *Bibliography* ◆ *Index*

2016	340 pp	Paperback
978–1–4704–2597–5		₹ 1,270.00

Algebraic Geometry for Scientists and Engineers

AMS

Shreeram S Abhyankar
Purdue University, West Lafayette, USA



This book, based on lectures presented in courses on algebraic geometry taught by the author at Purdue University, *is intended for engineers and scientists (especially computer scientists)*, as well as graduate students and advanced undergraduates in mathematics. In addition to providing a concrete or algorithmic approach to algebraic geometry, the author also attempts to motivate and explain its link to more modern algebraic geometry based on abstract algebra. The book covers various topics in the theory of algebraic curves and surfaces, such as rational and polynomial parametrization, functions and differentials on a curve, branches and valuations, and resolution of singularities. The emphasis is on presenting heuristic ideas and suggestive arguments rather than formal proofs. *Readers will gain new insight into the subject of algebraic geometry in a way that should increase appreciation of modern treatments of the subject, as well as enhance its utility in applications in science and industry.*

Contents: Rational and polynomial parametrizations Fractional linear transformations ◆ Cubic curves ◆ Cubic surfaces and general hypersurfaces ◆ Outline of the theory of plane curves ◆ Affine plane and projective plane ◆ Sphere with handles ◆ Functions and differentials on a curve ◆ Polynomials and power series ◆ Review of abstract algebra ◆ Some commutative algebra ◆ Hensel's lemma and Newton's theorem ◆ More about Newton's theorem ◆ Branches and valuations ◆ Divisors of functions and differentials ◆ Weierstrass preparation theorem Intersection multiplicity ◆ Resolution of singularities of plane curves Infinitely near singularities ◆ Parametrizing a quartic with three double points ◆ Characteristic pairs ◆ Criterion for one place and Jacobian problem ◆ Inversion formula and Jacobian problem Surfaces ◆ Hypersurfaces ◆ Resolution of singularities of algebraic surfaces ◆ Birational and polyrational transformations ◆ Valuations and birational correspondence ◆ Rational cylinders through a variety Resultants ◆ *Bibliography* ◆ *Index*

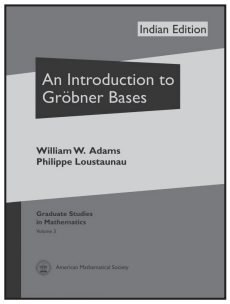
2011	312 pp	Paperback
978–0–8218–6894–2		₹ 1,590.00

Introduction to Gröbner Bases, An

AMS

William W Adams
University of Maryland, College Park, USA

Philippe Loustaunau
George Mason University, Fairfax, USA



As the primary tool for doing explicit computations in polynomial rings in many variables, Gröbner bases are an important component of all computer algebra systems. They are also important in computational commutative algebra and algebraic geometry. *This book provides a leisurely and fairly comprehensive introduction to Gröbner bases and their applications. Adams and Loustaunau cover the following topics*: the theory and construction of Gröbner bases for polynomials with coefficients in a field, applications of Gröbner bases to computational problems involving rings of polynomials in many variables, a method for computing syzygy modules and Gröbner bases in modules, and the theory of Gröbner bases for polynomials with coefficients in rings. *With over 120 worked out examples and 200 exercises, this book is aimed at advanced undergraduate and graduate students. It would be suitable as a supplement to a course in commutative algebra or as a textbook for a course in computer algebra or computational commutative algebra. This book would also be appropriate for students of computer science and engineering who have some acquaintance with modern algebra.*

Contents: Basic theory of Gröbner bases ◆ Applications of Gröbner bases ◆ Modules and Gröbner bases ◆ Gröbner bases over rings ◆ *Appendix A: Computations and algorithms* ◆ *Appendix B: Well-ordering and induction* ◆ *References* ◆ *List of symbols* ◆ *Index*

2012	**304 pp**	**Paperback**
978-0-8218-8715-8		**₹ 1,270.00**

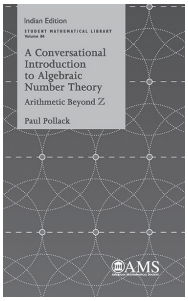
Algebraic Number Theory

A Conversational Introduction to Algebraic Number Theory

AMS

PRINT ON DEMAND

Paul Pollack
University of Georgia, Athens, GA



Gauss famously referred to mathematics as the "queen of the sciences" and to number theory as the "queen of mathematics". This book is an introduction to algebraic number theory, meaning the study of arithmetic in finite extensions of the rational number field Q. Originating in the work of Gauss, the foundations of modern algebraic number theory are due to Dirichlet, Dedekind, Kronecker, Kummer, and others. This book lays out basic results, including the three "fundamental theorems": unique factorization of ideals, finiteness of the class number, and Dirichlet's unit theorem. While these theorems are by now quite classical, both the text and the exercises allude frequently to more recent developments.

In addition to traversing the main highways, the book reveals some remarkable vistas by exploring scenic side roads. Several topics appear that are not present in the usual introductory texts. One example is the inclusion of an extensive discussion of the theory of elasticity, which provides a precise way of measuring the failure of unique factorization.

The book is based on the author's notes from a course delivered at the University of Georgia; pains have been taken to preserve the conversational style of the original lectures.

Contents: *Preface* ◆ Getting our feet wet ◆ Cast of characters ◆ Quadratic number fields: First steps ◆ Paradise lost —and found ◆ Euclidean quadratic fields

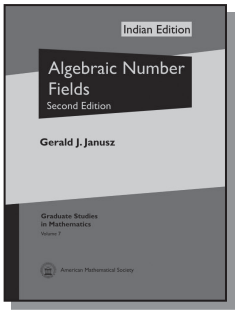
◆ Ideal theory for quadratic fields ◆ Prime ideals in quadratic number rings ◆ Units in quadratic number rings ◆ A touch of class ◆ Measuring the failure of unique factorization ◆ Euler's prime-producing polynomial and the criterion of Frobenius–Rabinowitsch ◆ Interlude: Lattice points ◆ Back to basics: Starting over with arbitrary number fields ◆ Integral bases: From theory to practice, and back ◆ Ideal theory in general number rings ◆ Finiteness of the class group and the arithmetic of \Z ◆ Prime decomposition in general number rings ◆ Dirichlet;s unit theorem, I ◆ A case study: Units in \Z[v[3]2] and the Diophantine equation $X^3-2Y^3\pm1$ ◆ Dirichlet's unit theorem, II ◆ More Minkowski magic, with a cameo appearance by Hermite ◆ Dedekind's discriminant theorem ◆ The quadratic Gauss sum ◆ Ideal density in quadratic number fields ◆ Dirichlet's class number formula ◆ Three miraculous appearances of quadratic class numbers ◆ *Index*

2020	**328 pp**	**Paperback**
978–14–7045–489–0		**₹ 1410.00**

Algebraic Number Fields (Second Edition)

AMS

Gerald J Janusz
University of Illinois at Urbana–Champaign, USA



The book is directed toward students with a minimal background who want to learn class field theory for number fields. The only prerequisite for reading it is some elementary Galois theory. The first three chapters lay out the necessary background in number fields, such as the arithmetic of fields, Dedekind domains, and valuations. The next two chapters discuss class field theory for number fields. The concluding chapter serves as an illustration of the concepts introduced in previous chapters. In particular, some interesting calculations with quadratic fields show the use of the norm residue symbol.

For the second edition the author added some new material, expanded many proofs, and corrected errors found in the first edition. *Janusz's book can be an excellent textbook for a year-long course in algebraic number theory; the first three chapters would be suitable for a one-semester course. It is also very suitable for independent study.*

Contents: Subrings of fields ◆ Complete fields ◆ Decomposition groups and the Artin map ◆ Analytic methods and Ray classes ◆ Class field theory ◆ Quadratic fields ◆ *Appendix* ◆ *References* ◆ *Index*

2010	**288 pp**	**Paperback**
978–0–8218–5219–4		**₹ 1,390.00**

Basic Quadratic Forms

AMS

Larry J Gerstein
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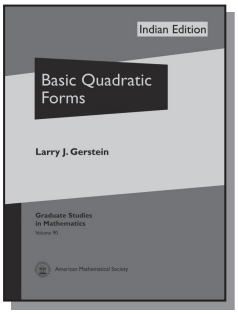


The arithmetic theory of quadratic forms is a rich branch of number theory that has had important applications to several areas of pure mathematics—particularly group theory and topology—as well as to cryptography and coding theory. *This book is a self-contained introduction to quadratic forms that is based on graduate courses the author has taught many times.* It leads the reader from foundation material up to topics of current research interest—with special attention to the theory over the integers and over polynomial rings in one variable over a field—and requires only a basic background in linear and abstract algebra as a prerequisite. Whenever possible, concrete constructions are chosen over more abstract arguments. *The book includes many exercises and explicit examples, and it is appropriate as a textbook for graduate*

courses or for independent study. To facilitate further study, a guide to the extensive literature on quadratic forms is provided.

Contents: A brief classical introduction ◆ Quadratic spaces and lattices ◆ Valuations, local fields, and padic numbers ◆ Quadratic spaces over Qp ◆ Quadratic spaces over Q ◆ Lattices over principal ideal domains ◆ Initial integral results ◆ Local classification of lattices ◆ The local-global approach to lattices ◆ Lattices over Fq ◆ Applications to cryptography ◆ *Further reading* ◆ *Bibliography* ◆ *Index*

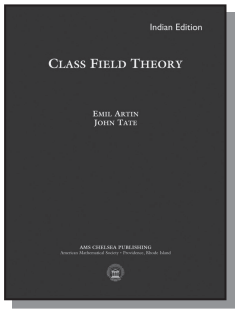
2012	**272 pp**	**Paperback**
978-0-8218-8720-2		**₹ 1,160.00**

Class Field Theory

AMS

Emil Artin
University of Texas at Austin, USA

John Tate
University of Texas at Austin, USA



This classic book, originally published in 1968, is based on notes of a year-long seminar the authors ran at Princeton University. *The primary goal of the book was to give a rather complete presentation of algebraic aspects of global class field theory, and the authors accomplished this goal spectacularly:* for more than 40 years since its first publication, the book has served as an ultimate source for many generations of mathematicians.

In this revised edition, two mathematical additions complementing the exposition in the original text are made. The new edition also contains several new footnotes, additional references, and historical comments.

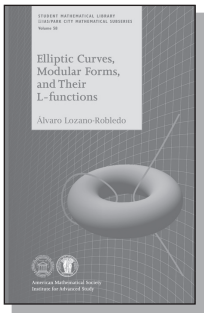
Contents: Preliminaries ◆ The first fundamental inequality ◆ Second fundamental inequality ◆ Reciprocity law ◆ The existence theorem ◆ Connected component of idèle classes ◆ The Grunwald-Wang theorem ◆ Higher ramification theory ◆ Explicit reciprocity laws ◆ Group extensions ◆ Abstract class field theory ◆ Weil groups ◆ *Bibliography*

2012	**200 pp**	**Paperback**
978-0-8218-8709-7		**₹ 1,200.00**

Elliptic Curves, Modular Forms and Other L-Functions

AMS

Álvaro Lozano-Robledo
University of Connecticut, Storrs, USA



Many problems in number theory have simple statements, but their solutions require a deep understanding of algebra, algebraic geometry, complex analysis, group representations, or a combination of all four. The original simply stated problem can be obscured in the depth of the theory developed to understand it. This book is an introduction to some of these problems, and an overview of the theories used nowadays to attack them, presented so that the number theory is always at the forefront of the discussion. Lozano-Robledo gives an introductory survey of elliptic curves, modular forms, and l-functions. His main goal is to provide the reader with the big picture of the surprising connections among these three families of mathematical objects and their meaning for number theory. As a case in point, Lozano-Robledo explains the modularity theorem and its famous consequence, Fermat's last theorem. He also discusses the Birch and Swinnerton-Dyer conjecture and other modern conjectures. This book concentrates on motivating the definitions, explaining the statements of the theorems and conjectures, making connections, and providing lots of examples, rather than dwelling on the hard

proofs.

Contents: *Preface* ◆ Chapter 1. Introduction ◆ Elliptic curves ◆ Modular forms ◆ L-functions ◆ Exercises ◆ Chapter 2. Elliptic curves ◆ Why elliptic curves? ◆ Definition ◆ Integral points ◆ The group structure on E(Q) ◆ The torsion subgroup ◆ Elliptic curves over finite fields ◆ The rank and the free part of E(Q) ◆ Linear independence of rational points ◆ Descent and the weak Mordell-Weil theorem ◆ Homogeneous spaces ◆ Selmer and Sha ◆ Exercises ◆ Chapter 3. Modular curves ◆ Elliptic curves over C ◆ Functions on lattices and elliptic functions ◆ Elliptic curves and the upper half-plane ◆ The modular curve X(1) ◆ Congruence subgroups ◆ Modular curves ◆ Exercises ◆ Chapter 4. Modular forms ◆ Modular forms for the modular group ◆ Modular forms for congruence subgroups ◆ The Petersson inner product ◆ Hecke operators acting on cusp forms ◆ Exercises ◆ Chapter 5. L-functions ◆ The L-function of an elliptic curve ◆ The Birch and Swinnerton-Dyer conjecture ◆ The L-function of a modular (cusp) form ◆ The Taniyama-Shimura-Weil conjecture ◆ Fermat's last theorem ◆ Looking back and looking forward ◆ Exercises ◆ *Appendix A. PARI/GP and Sage ◆ Elliptic curves ◆ Modular forms ◆ L-functions ◆ Other Sage commands ◆ Appendix B. Complex analysis ◆ Complex numbers ◆ Analytic functions ◆ Meromorphic functions ◆ The complex exponential function ◆ Theorems in complex analysis ◆ Quotients of the complex plane ◆ Exercises ◆ Appendix C. Projective space ◆ The projective line ◆ The projective plane ◆ Over an arbitrary field ◆ Curves in the projective plane ◆ Singular and smooth curves ◆ Appendix D. The p-adic numbers ◆ Hensel's lemma ◆ Exercises ◆ Appendix E. Parametrization of torsion structures ◆ Bibliography ◆ Index*

2016	204 pp	Paperback
978–1–4704–2593–7		₹ 1,225.00

Analysis

Advanced Calculus (Second Edition)

AMS

Patrick M Fitzpatrick
University of Maryland, College Park, USA

This book is self-contained and starts with the creation of basic tools using the completeness axiom. The continuity, differentiability, integrability, and power series representation properties of functions of a single variable are established. The next few chapters describe the topological and metric properties of Euclidean space. These are the basis of a rigorous treatment of differential calculus (including the Implicit Function Theorem and Lagrange Multipliers) for mappings between Euclidean spaces and integration for functions of several real variables.

Special attention has been paid to the motivation for proofs. Selected topics, such as the Picard Existence Theorem for differential equations, have been included in such a way that selections may be made while preserving a fluid presentation of the essential material. *Supplemented with numerous exercises,* Advanced Calculus *is a perfect book for undergraduate students of analysis.*

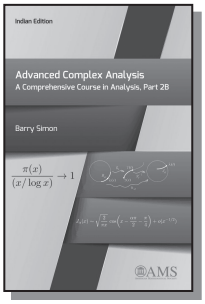
Contents: Tools for Analysis ◆ Convergent Sequences ◆ Continuous Functions ◆ Differentiation ◆ Elementary Functions as solutions of Differential Equations ◆ Integration: Two Fundamental Theorems ◆ Integration: Further Topics ◆ Approximation by Taylor Polynomials ◆ Sequences and Series of Functions ◆ The Euclidean Space ◆ Continuity, Compactness, and Connectedness ◆ Metric Spaces ◆ Differentiating Functions of Several Variables ◆ Local Approximation of Real-Valued Functions ◆ Approximating Nonlinear Mappings by Linear Mappings ◆ Images and Inverses: The Inverse Function Theorem ◆ The Implicit Function Theorem and its Applications ◆ Integarting Functions of Several Variables ◆ Iterated Integration and Changes of Variables ◆ Line and Surface Integrals ◆ Consequences of the Field and Positivity Axioms Linear Algebra ◆ Index

2010	608 pp	Paperback
978–0–8218–5209–5		₹ 2,120.00

Advanced Complex Analysis: A Comprehensive Course in Analysis, Part 2B

AMS

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 2B provides a comprehensive look at a number of subjects of complex analysis not included in Part 2A. Presented in this volume are the theory of conformal metrics (including the Poincaré metric, the Ahlfors-Robinson proof of Picard's theorem, and Bell's proof of the Painlevé smoothness theorem), topics in analytic number theory (including Jacobi's two- and foursquare theorems, the Dirichlet prime progression theorem, the prime number theorem, and the Hardy–Littlewood asymptotics for the number of partitions), the theory of Fuchsian differential equations, asymptotic methods (including Euler's method, stationary phase, the saddle-point method, and the WKB method), univalent functions (including an introduction to SLE), and Nevanlinna theory. The chapters on Fuchsian differential equations and on asymptotic methods can be viewed as a minicourse on the theory of special functions.

See also: Basic complex analysis, Harmonic analysis, Real analysis

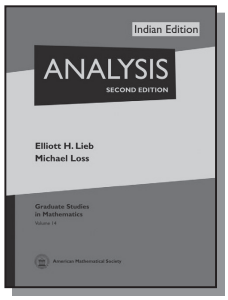
2017 **340 pp** **Paperback**
978-1-4704-3777-0 **₹1,690.00**

Analysis (Second Edition)

AMS

Elliott H Lieb
Princeton University, USA

Michael Loss
Georgia Institute of Technology, Atlanta, USA



Significantly revised and expanded, this new second edition provides readers at all levels—from beginning students to practicing analysts—with the basic concepts and standard tools necessary to solve problems of analysis, and how to apply these concepts to research in a variety of areas.

Authors Elliott Lieb and Michael Loss take you quickly from basic topics to methods that work successfully in mathematics and its applications. While omitting many usual typical textbook topics. Analysis includes all necessary definitions, proofs, explanations, examples, and exercises to bring the reader to an advanced level of understanding with a minimum of fuss, and, at the same time, doing so in a rigorous and pedagogical way. Many topics that are useful and important, but usually left to advanced monographs, are presented in Analysis, and these give the beginner a sense that the subject is alive and growing.

This edition includes: a new chapter on Eigenvalues that covers the min-max principle, semi-classical approximation, coherent states, Lieb–Thirring inequalities, and more extensive additions to chapters covering Sobolev Inequalities, including the Nash and Log Sobolev inequalities new material on Measure and Integration many new exercises and much more.

This edition is an authoritative, straightforward volume that readers—from the graduate student, to the professional mathematician, to the physicist or engineer using analytical methods--will find useful, both as a reference and as a guide to real problem solving.

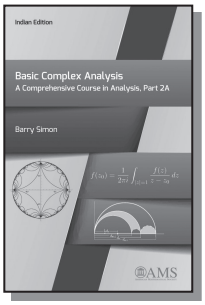
Contents: Measure and integration ◆ L p-spaces ◆ Rearrangement inequalities ◆ Integral inequalities ◆ The Fourier transform ◆ Distributions ◆ The Sobolev spaces H 1 and H 1/2 ◆ Sobolev inequalities ◆ Potential theory and Coulomb energies ◆ Regularity of solutions of Poisson's equation ◆ Introduction to the calculus of variations ◆ More about eigenvalues ◆ *Part Title* ◆ *List of symbols* ◆ *References* ◆ *Index*

2013	376 pp	Paperback
978-1-4704-0932-6		₹ 1,600.00

Basic Complex Analysis: A Comprehensive Course in Analysis, Part 2A

AMS

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 2A is devoted to basic complex analysis. It interweaves three analytic threads associated with Cauchy, Riemann, and Weierstrass, respectively. Cauchy's view focuses on the differential and integral calculus of functions of a complex variable, with the key topics being the Cauchy integral formula and contour integration. For Riemann, the geometry of the complex plane is central, with key topics being fractional linear transformations and conformal mapping. For Weierstrass, the power series is king, with key topics being spaces of analytic functions, the product formulas of Weierstrass and Hadamard, and the Weierstrass theory of elliptic functions. Subjects in this volume that are often missing in other texts include the Cauchy integral theorem when the contour is the boundary of a Jordan region, continued fractions, two proofs of the big Picard theorem, the uniformization theorem, Ahlfors's function, the sheaf of analytic germs, and Jacobi, as well as Weierstrass, elliptic functions.

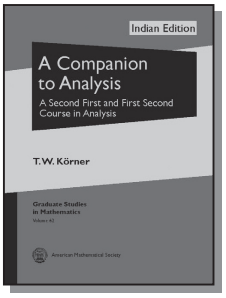
See also: Advanced complex analysis, Harmonic analysis, Real analysis

2017	664 pp	Paperback
978-1-4704-3776-3		₹ 2,100.00

Companion to Analysis, A: A Second First and First Second Course in Analysis

AMS

T W Körner
University of Cambridge, UK



Many students acquire knowledge of a large number of theorems and methods of calculus without being able to say how they work together. This book provides those students with the coherent account that they need. *A Companion to Analysis explains the problems that must be resolved in order to procure a rigorous development of the calculus and shows the student how to deal with those problems. Starting with the real line, the book moves on to finite-dimensional spaces and then to metric spaces. Readers who work through this text will be ready for courses such as measure theory, functional analysis, complex analysis, and differential geometry*.

Moreover, they will be well on the road that leads from mathematics student to mathematician. With this book, well-known author Thomas Körner provides able and hard-working students a great *text for independent study or for an advanced undergraduate or first-level graduate course. It includes many stimulating exercises.* An appendix contains

a large number of accessible but non-routine problems that will help students advance their knowledge and improve their technique.

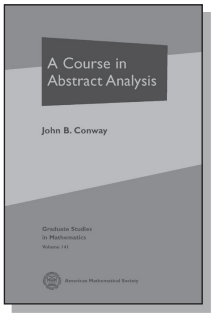
Contents: The real line ◆ A first philosophical interlude ◆ Other versions of the fundamental axiom Higher dimensions ◆ Sums and such like *heartsuit* ◆ Differentiation ◆ Local Taylor theorems ◆ The Riemann integral ◆ Developments and limitations of the Riemann integral *heartsuit* ◆ Metric spaces ◆ Complete metric spaces ◆ Contraction mappings and differential equations ◆ Inverse and implicit functions ◆ Completion ◆ *Appendices Executive summary* ◆ *Exercises* ◆ *Bibliography* ◆ *Index*

2011	**608 pp**	**Paperback**
978–0–8218–6878–2		**₹ 2,350.00**

Course in Abstract Analysis, A

AMS

John B Conway
George Washington University, USA



This book covers topics appropriate for a first-year graduate course preparing students for the doctorate degree. The first half of the book presents the core of measure theory, including an introduction to the Fourier transform. This material can easily be covered in a semester. The second half of the book treats basic functional analysis and can also be covered in a semester. After the basics, it discusses linear transformations, duality, the elements of Banach algebras, and c*-algebras. lt concludes with a characterization of the unitary equivalence classes of normal operators on a Hilbert space. The book is self-contained and only relies on a background in functions of a single valuable and the elements of metric spaces. Following the author's belief that the best way to learn is to start with the particular and proceed to the more general, it contains numerous examples and exercises.

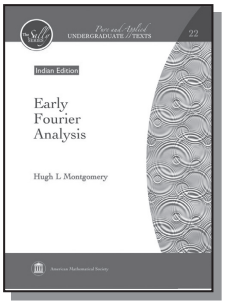
Contents: *Preface* ◆ Chapter 1. Setting the Stage ◆ Riemann–Stieltjes integrals ◆ Metric spaces redux ◆ Normed spaces ◆ Locally compact spaces ◆ Linear functionals ◆ Chapter 2. Elements of Measure Theory ◆ Positive linear functionals on C(X) ◆ The Radon measure space ◆ Measurable functions ◆ Integration with respect to a measure ◆ Convergence theorems ◆ Signed measures ◆ Lp-spaces ◆ Chapter 3. A Hilbert Space Interlude ◆ Introduction to Hilbert space ◆ Orthogonality ◆ The Riesz Representation Theorem ◆ Chapter 4. A Return to Measure Theory ◆ The Lebesgue–Radon–Nikodym Theorem ◆ Complex functions and measures ◆ Linear functionals on C(X) ◆ Linear functionals on C0(X) ◆ Functions of bounded variation ◆ Linear functionals on Lp-spaces ◆ Product measures 4.8. Lebesgue measure on Rd ◆ Differentiation on Rd ◆ Absolutely continuous functions ◆ Convolution ◆ The Fourier transform ◆ Chapter 5. Linear Transformations ◆ Basics ◆ Orthonormal basis ◆ Isomorphic Hilbert spaces ◆ The adjoint ◆ The direct sum of Hilbert spaces ◆ Compact linear transformations ◆ The Spectral Theorem ◆ Some applications of the Spectral Theorem ◆ Unitary equivalence ◆ Chapter 6. Banach Spaces ◆ Finite-dimensional spaces ◆ Sums and quotients of normed spaces ◆ The Hahn–Banach Theorem ◆ Banach limits ◆ The Open Mapping and Closed Graph Theorems ◆ Complemented subspaces ◆ The Principle of Uniform Boundedness ◆ Chapter 7. Locally Convex Spaces ◆ Basics of locally convex spaces ◆ Metrizable locally convex spaces ◆ Geometric consequences ◆ Chapter 8. Duality ◆ Basics of duality ◆ The dual of a quotient space and of a subspace ◆ Reflexive spaces ◆ The Krein–Milman Theorem ◆ The Stone–Weierstrass Theorem ◆ Chapter 9. Operators on a Banach Space ◆ The adjoint ◆ Compact operators ◆ Chapter 10. Banach Algebras and Spectral Theory ◆ Elementary properties and examples ◆ Ideals and quotients ◆ Analytic functions ◆ The spectrum ◆ The spectrum of an operator ◆ The spectrum of a compact operator ◆ Abelian Banach algebras ◆ Chapter 11. C*-Algebras ◆ Elementary properties and examples ◆ Abelian C*-algebras ◆ Positive elements in a C*-algebra ◆ A functional calculus for normal operators ◆ The commutant of a normal operator ◆ Multiplicity theory ◆ *Appendix A.1. Baire Category Theorem* ◆ *A.2. Nets 356* ◆ *Bibliography* ◆ *List of Symbols* ◆ *Index*

2016	**384 pp**	**Paperback**
978–1–4704–2587–6		**₹ 1,600.00**

Early Fourier Analysis

AMS

Hugh L Montgomery
University of Michigan, Ann Arbor, MI



Fourier Analysis is an important area of mathematics, especially in light of its importance in physics, chemistry, and engineering. Yet it seems that this subject is rarely offered to undergraduates. This book introduces Fourier Analysis in its three most classical settings: The Discrete Fourier Transform for periodic sequences, Fourier Series for periodic functions, and the Fourier Transform for functions on the real line.

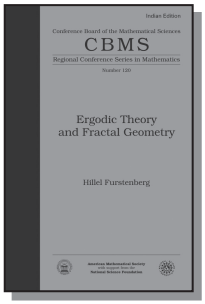
The presentation is accessible for students with just three or four terms of calculus, but the book is also intended to be suitable for a junior–senior course, for a capstone undergraduate course, or for beginning graduate students. Material needed from real analysis is quoted without proof, and issues of Lebesgue measure theory are treated rather informally. Included are a number of applications of Fourier Series, and Fourier Analysis in higher dimensions is briefly sketched. A student may eventually want to move on to Fourier Analysis discussed in a more advanced way, either by way of more general orthogonal systems, or in the language of Banach spaces, or of locally compact commutative groups, but the experience of the classical setting provides a mental image of what is going on in an abstract setting.

2017	**400 pp**	**Paperback**
978–1–4704–3720–6		**₹ 1,770.00**

Ergodic Theory and Fractal Geometry

AMS

Hillel Furstenberg
The Hebrew University of Jerusalem, Jerusalem, Israel



Fractal geometry represents a radical departure from classical geometry, which focuses on smooth objects that 'straighten out' under magnification. Fractals, which take their name from the shape of fractured objects, can be characterised as retaining their lack of smoothness under magnification. The properties of fractals come to light under repeated magnification, which we refer to informally as 'zooming in.' This zooming-in process has its parallels in dynamics, and the varying 'scenery' corresponds to the evolution of dynamical variables.

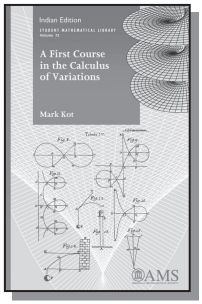
The present monograph focuses on applications of one branch of dynamics – ergodic theory – to the geometry of fractals. Much attention is given to the all-important notion of fractal dimension, which is shown to be intimately related to the study of ergodic averages. It has been long known that dynamical systems serve as a rich source of fractal examples. The primary goal in this monograph is to demonstrate how the minute structure of fractals is unfolded when seen in the light of related dynamics.

2017	**80 pp**	**Paperback**
978–1–4704–3726–8		**₹ 1,075.00**

First Course in the Calculus of Variations, A

AMS

Mark Kot
University of Washington, Seattle, WA



This book is intended for a first course in the calculus of variations, at the senior or beginning graduate level. The reader will learn methods for finding functions that maximise or minimise integrals. The text lays out important necessary and sufficient conditions for extrema in historical order, and it illustrates these conditions with numerous worked-out examples from mechanics, optics, geometry and other fields.

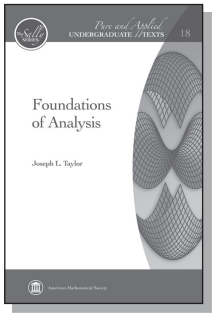
The exposition starts with simple integrals containing a single independent variable, a single dependent variable and a single derivative, subject to weak variations, but steadily moves on to more advanced topics, including multivariate problems, constrained extrema, homogeneous problems, problems with variable endpoints, broken extremals, strong variations and sufficiency conditions. Numerous line drawings clarify the mathematics. Each chapter ends with recommended readings that introduce the student to the relevant scientific literature and with exercises that consolidate understanding.

2017	**312 pp**	**Paperback**
978-1-4704-3739-8		**₹ 1,690.00**

Foundations of Analysis

AMS

Joseph L Taylor
University of Utah, Salt Lake City, USA



Analysis plays a crucial role in the undergraduate curriculum. Building upon the familiar notions of calculus, analysis introduces the depth and rigor characteristic of higher mathematics courses. Foundations of analysis has two main goals. The first is to develop in students the mathematical maturity and sophistication they will need as they move through the upper division curriculum. The second is to present a rigorous development of both single and several variable calculus, beginning with a study of the properties of the real number system. The presentation is both thorough and concise, with simple, straightforward explanations. The exercises differ widely in level of abstraction and level of difficulty. They vary from the simple to the quite difficult and from the computational to the theoretical. Each section contains a number of examples designed to illustrate the material in the section and to teach students how to approach the exercises for that section. The list of topics covered is rather standard, although the treatment of some of them is not. The several variable material makes full use of the power of linear algebra particularly in the treatment of the differential of a function as the best affine approximation to the function at a given point. The text includes a review of several linear algebra topics in preparation for this material. In the final chapter, vector calculus is presented from a modern point of view, using differential forms to give a unified treatment of the major theorems relating derivatives and integrals: green's, gauss's, and stokes's theorems. At appropriate points, abstract metric spaces, topological spaces, inner product spaces, and normed linear spaces are

introduced, but only as asides. That is, the course is grounded in the concrete world of Euclidean space, but the students are made aware that there are more exotic worlds in which the concepts they are learning may be studied.

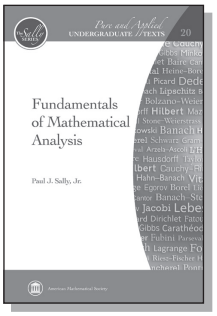
Contents: *Preface* ◆ Chapter 1. The Real Numbers ◆ Sets and Functions ◆ The Natural Numbers ◆ Integers and Rational Numbers ◆ The Real Numbers ◆ Sup and Inf ◆ Chapter 2. Sequences ◆ Limits of Sequences ◆ Using the Definition of Limit ◆ Limit Theorems ◆ Monotone Sequences ◆ Cauchy Sequences ◆ lim inf and lim sup ◆ Chapter 3. Continuous Functions ◆ Continuity ◆ Properties of Continuous Functions ◆ Uniform Continuity ◆ Uniform Convergence ◆ Chapter 4. The Derivative ◆ Limits of Functions ◆ The Derivative ◆ The Mean Value Theorem ◆ L'Hopital's Rule ◆ Chapter 5. The Integral ◆ Definition of the Integral ◆ Existence and Properties of the Integral ◆ The Fundamental Theorems of Calculus ◆ Logs, Exponentials, Improper Integrals ◆ Chapter 6. Infinite Series ◆ Convergence of Infinite Series ◆ Tests for Convergence ◆ Absolute and Conditional Convergence ◆ Power Series ◆ Taylor's Formula ◆ Chapter 7. Convergence in Euclidean Space ◆ Euclidean Space ◆ Convergent Sequences of Vectors ◆ Open and Closed Sets ◆ Compact Sets ◆ Connected Sets ◆ Chapter 8. Functions on Euclidean Space ◆ Continuous Functions of Several Variables ◆ Properties of Continuous Functions ◆ Sequences of Functions ◆ Linear Functions, Matrices ◆ Dimension, Rank, Lines, and Planes ◆ Chapter 9. Differentiation in Several Variables ◆ Partial Derivatives ◆ The Differential ◆ The Chain Rule ◆ Applications of the Chain Rule ◆ Taylor's Formula ◆ The Inverse Function Theorem ◆ The Implicit Function Theorem ◆ Chapter 10. Integration in Several Variables ◆ Integration over a Rectangle ◆ Jordan Regions ◆ The Integral over a Jordan Region ◆ Iterated Integrals ◆ The Change of Variables Formula ◆ Chapter 11. Vector Calculus ◆ 1-forms and Path Integrals ◆ Change of Variables ◆ Differential Forms of Higher Order ◆ Green's Theorem ◆ Surface Integrals and Stokes's Theorem ◆ Gauss's Theorem ◆ Chains and Cycles ◆ *Appendix. Degrees of Infinity* ◆ *Cardinality of Sets* ◆ *Countable Sets* ◆ *Uncountable Sets* ◆ *The Axiom of Choice* ◆ *Bibliography* ◆ *Index*

2016	**408 pp**	**Paperback**
978–1–4704–2579–1		**₹ 1,670.00**

Fundamentals of Mathematical Analysis

AMS

Paul J Sally, Jr.
University of Chicago, USA



This is a textbook for a course in honours analysis (for freshman/sophomore undergraduates) or real analysis (for junior/senior undergraduates) or analysis-i (beginning graduates). It is intended for students who completed a course in "ap calculus'; possibly followed by a routine course in multivariable calculus and a computational course in linear algebra. There are three features that distinguish this book from many other books of a similar nature and which are 'important for the use of this book as a text. The first and most important feature is the collection of exercises. These are spread throughout the chapters and should be regarded as an essential component of the student's learning. Some of these exercises comprise a routine follow-up to the material, while others challenge the student's understanding more deeply. The second feature is the set of independent projects presented at the end of each chapter. These projects supplement the content studied in their respective chapters. They can be used to expand the student's knowledge and understanding or as an opportunity to conduct a seminar in inquiry based learning in which the students present the material to their class. The third really important feature is a series of challenge problems that increase in impossibility as the chapters progress.

Contents: *Preface* ◆ *Acknowledgments* ◆ Chapter 1. The Construction of Real and Complex Numbers ◆ The Least Upper Bound Property and the Real Numbers ◆ Consequences of the Least Upper Bound Property ◆ Rational Approximation ◆ Intervals ◆ The

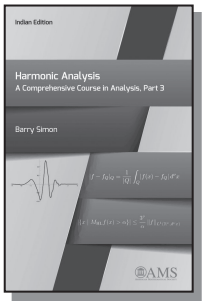
Construction of the Real Numbers ◆ Convergence in R ◆ Automorphisms of Fields ◆ Complex Numbers ◆ Convergence in C ◆ Independent Projects ◆ Chapter 2. Metric and Euclidean Spaces ◆ Introduction ◆ Definition and Basic Properties of Metric Spaces ◆ Topology of Metric Spaces ◆ Limits and Continuous Functions ◆ Absolute Continuity and Bounded Variation in R ◆ Compactness, Completeness, and Connectedness ◆ Independent Projects ◆ Chapter 3. Complete Metric Spaces ◆ The Contraction Mapping Theorem and Its Applications to Differential and Integral Equations ◆ The Baire Category Theorem and the Uniform Boundedness Principle ◆ Stone-Weierstrass Theorem ◆ The p-adic Completion of Q ◆ Independent Projects ◆ Chapter 4. Normed Linear Spaces ◆ Definitions and Basic Properties ◆ Bounded Linear Operators ◆ Fundamental Theorems about Linear Operators ◆ Extending Linear Functionals ◆ Generalized Limits and the Dual of ∞(F) ◆ Adjoint Operators and Isometries of Normed Linear Spaces ◆ Concrete Facts about Isometries of Normed Linear Spaces ◆ Locally Compact Groups ◆ Hilbert Spaces ◆ Convergence and Selfadjoint Operators ◆ Independent Projects ◆ Chapter 5. Differentiation ◆ Review of Differentiation in One Variable ◆ Differential Calculus in Rn ◆ The Derivative as a Matrix of Partial Derivatives ◆ The Mean Value Theorem ◆ Higher-Order Partial Derivatives and Taylor's Theorem ◆ Hypersurfaces and Tangent Hyperplanes in Rn ◆ Max-Min Problems ◆ Lagrange Multipliers ◆ The Implicit and Inverse Function Theorems ◆ Independent Projects ◆ Chapter 6. Integration ◆ Measures ◆ Lebesgue Measure ◆ Measurable Functions ◆ The Integral ◆ Lp Spaces ◆ Fubini's Theorem ◆ Change of Variables in Integration ◆ Independent Projects ◆ Chapter 7. Fourier Analysis on Locally Compact Abelian Groups ◆ Fourier Analysis on the Circle ◆ Fourier Analysis on Locally Compact Abelian Groups ◆ The Determination of G ◆ The Fourier Transform on (R, +) ◆ Fourier Inversion on (R, +) ◆ Fourier Analysis on p-adic Fields ◆ Independent Projects ◆ *Appendix A. Sets, Functions, and Other Basic Ideas ◆ Sets and Elements ◆ Equality, Inclusion, and Notation ◆ The Algebra of Sets ◆ Cartesian Products, Counting, and Power Sets ◆ Some Sets of Numbers ◆ Equivalence Relations and the Construction of Q ◆ Functions ◆ Countability and Other Basic Ideas ◆ The Axiom of Choice 305 ◆ Independent Projects ◆ Appendix B. Linear Algebra ◆ Fundamentals of Linear Algebra ◆ Linear Transformations ◆ Linear Transformations and Matrices ◆ Determinants ◆ Geometric Linear Algebra ◆ Independent Projects ◆ Bibliography ◆ Index of Terminology Index of Notation Definitions*

2016	376 pp	Paperback
978–1–4704–2581–4		₹1,600.00

Harmonic Analysis: A Comprehensive Course in Analysis, Part 3

AMS PRINT ON DEMAND

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 3 returns to the themes of Part 1 by discussing pointwise limits (going beyond the usual focus on the Hardy–Littlewood maximal function by including ergodic theorems and martingale convergence), p harmonic functions and potential theory, frames and wavelets, H spaces [including bounded mean oscillation (BMO)] and, in the final chapter, lots of inequalities, including Sobolev spaces, Calderon–Zygmund estimates, and hypercontractive semigroups.

2017	784 pp	Paperback
978–1–4704–3778–7		₹2,050.00

Introduction to Analysis (Fifth Edition)

AMS

Edward D Gaughan
New Mexico State University, Las Cruces, USA

Introduction to Analysis *is designed to bridge the gap between the intuitive calculus usually offered at the undergraduate level and the sophisticated analysis courses the student encounters at the graduate level.* A considerable amount of time is spent motivating the theorems and proofs and developing the reader's intuition. The topics are quite standard: convergence of sequences, limits of functions, continuity, differentiation, the Riemann integral, infinite series, power series, and convergence of sequences of functions. *Many examples are given to illustrate the theory, and exercises at the end of each chapter are keyed to each section. Also, at the end of each section, one finds several Projects.* The purpose of a Project is to give the reader a substantial mathematical problem and the necessary guidance to solve that problem. *A Project is distinguished from an exercise in that the solution of a Project is a multi-step process requiring assistance for the beginner student.*

Contents: Preliminaries ◆ Sequences ◆ Limits of Functions ◆ Continuity ◆ Differentiation ◆ The Riemann Integral ◆ Infinite Series ◆ Sequences and Series of Functions ◆ *Index*

2010	**256 pp**	**Paperback**
978-0-8218-5206-4		**₹ 1,010.00**

Introduction to Analysis, An

Arlen Brown & Carl Pearcy

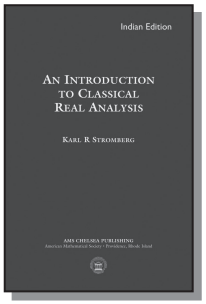
This book is intended to serve as a textbook for an introductory course in mathematical analysis. In preliminary form it has been used in this way at the University of Michigan, Indiana University, and Texas A&M University. *The book addresses the needs of a beginner graduate student, that is a student who has completed an undergraduate program with a mathematics major.*

2010	**304 pp**	**Paperback**
978-81-8489-620-6		**₹ 960.00**

Introduction to Classical Real Analysis, An

AMS

Karl R Stromberg



This classic book is a text for a standard introductory course in real analysis, covering sequences and series, limits and continuity, differentiation, elementary transcendental functions, integration, infinite series and products, and trigonometric series. The author has scrupulously avoided any presumption at all that the reader has any knowledge of mathematical concepts until they are formally presented in the book.

One significant way in which this book differs from other texts at this level is that the integral which is first mentioned is the Lebesgue integral on the real line. There are at least three good reasons for doing this. First, this approach is no more difficult to understand than is the traditional theory of the Riemann integral. Second, the readers will profit from acquiring a thorough understanding of Lebesgue integration on Euclidean spaces before they enter into a study of abstract measure theory. Third, this is the integral that is most useful to current applied mathematicians and theoretical scientists, and is essential for any serious work with trigonometric series.

The exercise sets are a particularly attractive feature of this book. A great many of the exercises are projects of many parts which, when completed in the order given, lead the student by easy stages to important and interesting results. Many of the exercises are supplied with copious hints.

2017	**592 pp**	**Paperback**
978-1-4704-3728-2		**₹ 2,395.00**

Invitation to Classical Analysis

AMS

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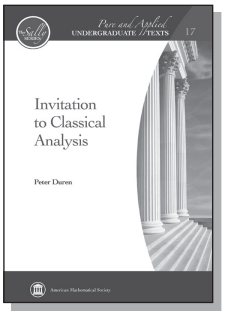


This book gives a rigorous treatment of selected topics in classical analysis, with many applications and examples. The exposition is at the undergraduate level, building on basic principles of advanced calculus without appeal to more sophisticated techniques of complex analysis and Lebesgue integration. Among the topics covered are Fourier series and integrals, approximation theory, Stirling's formula, the gamma function. Bernoulli numbers and polynomials, the Riemann zeta function, Tauberian theorems, elliptic integrals, ramifications of the cantor set, and a theoretical discussion of differential equations including power series solutions at regular singular points, Bessel functions, hypergeometric functions, and Sturm comparison theory. Preliminary chapters offer rapid reviews of basic principles and further background material such as infinite products and commonly applied inequalities. This book is designed for individual study but can also serve as a text for second semester courses in advanced calculus. Each chapter concludes with an abundance of exercises. Historical notes discuss the evolution of mathematical ideas and their relevance to physical applications. Special features are capsule scientific biographies of the major players and a gallery of portraits. Although this book is designed for undergraduate students, others may find it an accessible source of information on classical topics that underlie modern developments in pure and applied mathematics.

Contents: *Preface* ◆ Chapter 1. Basic Principles ◆ Mathematical induction ◆ Real numbers ◆ Completeness principles ◆ Numerical sequences ◆ Infinite series ◆ Continuous functions and derivatives ◆ The Riemann integral ◆ Uniform convergence ◆ Historical remarks ◆ Metric spaces ◆ Complex numbers Exercises ◆ Chapter 2. Special Sequences ◆ The number e ◆ Irrationality of π ◆ Euler's constant ◆ Vieta's product formula ◆ Wallis product formula ◆ Stirling's formula Exercises ◆ Chapter 3. Power Series and Related Topics ◆ General properties of power series ◆ Abel's theorem ◆ Cauchy products and Mertens' theorem ◆ Taylor's formula with remainder ◆ Newton's binomial series ◆ Composition of power series ◆ Euler's sum ◆ Continuous nowhere differentiable functions Exercises ◆ Chapter 4. Inequalities ◆ Elementary inequalities ◆ Cauchy's inequality ◆ Arithmetic–geometric mean inequality ◆ Integral analogues ◆ Jensen's inequality ◆ Hilbert's inequality Exercises ◆ Chapter 5. Infinite Products ◆ Basic concepts ◆ Absolute convergence ◆ Logarithmic series ◆ Uniform convergence Exercises ◆ Chapter 6. Approximation by Polynomials ◆ Interpolation ◆ Weierstrass approximation theorem ◆ Landau's proof ◆ Bernstein polynomials ◆ Best approximation ◆ Stone–Weierstrass theorem ◆ Refinements of Weierstrass theorem Exercises ◆ Chapter 7. Tauberian Theorems ◆ Summation of divergent series ◆ Tauber's theorem ◆ Theorems of Hardy and Littlewood ◆ Karamata's proof ◆ Hardy's power series Exercises ◆ Chapter 8. Fourier Series ◆ Physical origins ◆ Orthogonality relations ◆ Mean-square approximation ◆ Convergence of Fourier series ◆ Examples ◆ Gibbs' phenomenon ◆ Arithmetic means of partial sums ◆ Continuous functions with divergent Fourier series ◆ Fourier transforms ◆ Inversion of Fourier transforms ◆ Poisson summation formula Exercises ◆ Chapter 9. The Gamma Function ◆ Probability integral ◆ Gamma function ◆ Beta function ◆ Legendre's duplication formula ◆ Euler's reflection formula ◆ Infinite product representation ◆ Generalization of Stirling's formula ◆ Bohr–Mollerup theorem ◆ A special integral Exercises ◆ Chapter 10. Two Topics in Number Theory ◆ Equidistributed sequences ◆ Weyl's criterion ◆ The Riemann zeta function ◆ Connection with the gamma function ◆ Functional equation Exercises ◆ Chapter 11. Bernoulli Numbers ◆ Calculation of Bernoulli numbers ◆ Sums of positive powers ◆ Euler's sums ◆ Bernoulli polynomials ◆ Euler–Maclaurin summation formula ◆ Applications of Euler–Maclaurin formula Exercises ◆ Chapter 12. The Cantor Set ◆ Cardinal numbers ◆ Lebesgue measure ◆ The Cantor set ◆ The Cantor–Scheeffer function ◆ Space-filling curves Exercises

◆ Chapter 13. Differential Equations ◆ Existence and uniqueness of solutions ◆ Wronskians ◆ Power series solutions ◆ Bessel functions ◆ Hypergeometric functions ◆ Oscillation and comparison theorems ◆ Refinements of Sturm's theory Exercises ◆ Chapter 14. Elliptic Integrals ◆ Standard forms ◆ Fagnano's duplication formula ◆ The arithmetic–geometric mean ◆ The Legendre relation ◆ *Exercises Index of Names* ◆ *Subject Index*

2016	**408 pp**	**Paperback**
978–1–4704–2578–4		**₹ 1,670.00**

Mathematical Analysis

Alladi Sitaram & Vishwambhar Pati (Eds.)

This collection of mathematical articles focusses on some elementary aspects of mathematical analysis, especially infinite sequences and infinite series. Some foundational issues have been addressed in the course of providing rigorous proofs of mathematical results. Biographical sketches of the mathematicians who have contributed to analysis enrich the content of this book.

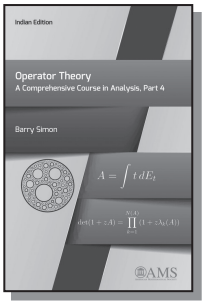
It can be used by students of mathematics to supplement what they learn in their regular courses.

2001	**160 pp**	**Paperback**
978–81–7371–291–3		**₹ 715.00**

Operator Theory: A Comprehensive Course in Analysis, Part 4

AMS

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 4 focuses on operator theory, especially on a Hilbert space. Central topics are the spectral theorem, the theory of trace class and Fredholm determinants, and the study of unbounded self-adjoint operators.

There is also an introduction to the theory of orthogonal polynomials and a long chapter on Banach algebras, including the commutative and non-commutative Gel'fand-Naimark theorems and Fourier analysis on general locally compact abelian groups.

2017	**752 pp**	**Paperback**
978–1–4704–3779–4		**₹ 2,460.00**

p–adic Analysis Compared with Real

AMS

Svetlana Katok
Pennsylvania State University, University Park, USA

The book gives an introduction to p-adic numbers from the point of view of number theory, topology, and analysis. Compared to other books on the subject, its novelty is both a particularly balanced approach to these three points of view and an *emphasis on topics accessible to undergraduates.* In addition, several topics from real analysis and elementary topology which are not usually covered in undergraduate courses (totally disconnected spaces and Cantor sets, points of discontinuity of maps and the Baire Category Theorem, surjectivity of isometries of compact metric spaces) are also included in the book. They will enhance the reader's understanding of real analysis and intertwine the real and p-adic contexts of the book.

The choice of the topic was motivated by the internal beauty of the subject of p-adic analysis, an unusual one in the undergraduate curriculum, and abundant opportunities to compare it with its much more familiar real counterpart. *The book includes a large number of exercises. Answers, hints, and solutions for most of them appear at the end of the book. The book can be successfully used in a topic course or for self-study.*

Contents: Arithmetic of the p-adic Numbers ◆ The Topology of Qg vs. the Topology of R ◆ Elementary

Analysis in Qp ◆ p-adic Functions ◆ Answers, Hints, and Solutions for Selected Exercises ◆ *Bibliography* ◆ *Index*

2010	168 pp	Paperback
978–0–8218–5224–8		₹1,385.00

Problems in Mathematical Analysis I: Real Numbers, Sequences and Series

AMS

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M T Nowak
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We learn by doing. We learn mathematics by doing problems. This book is the first volume of a series of *books of problems in mathematical analysis. It is mainly intended for students studying the basic principles of analysis*. However, given its organisation, level, and selection of problems, it would also be an *ideal choice for tutorial or problem-solving seminars*, particularly those geared toward the Putnam exam. The volume is also *suitable for self-study*. Each section of the book begins with relatively *simple exercises*, yet may also contain quite *challenging problems*. Very often several consecutive exercises are concerned with different aspects of one mathematical problem or theorem. *This presentation of material is designed to help student comprehension and to encourage them to ask their own questions and to start research. The collection of problems in the book is also intended to help teachers who wish to incorporate the problems into lectures. Solutions for all the problems are provided.*

Contents: *Problems* ◆ Real numbers ◆ Sequence of real numbers ◆ Series of real numbers ◆ Solutions ◆ Real numbers ◆ Sequences of real numbers ◆ *Series of real numbers* ◆ *Bibliography*

2009	396 pp	Paperback
978–0–8218–4854–8		₹1,830.00

Problems in Mathematical Analysis II: Continuity and Differentiation

AMS

W J Kaczor
Marie Curie–Sklodowska University, Lublin, Poland

M T Nowak
Marie Curie–Sklodowska University, Lublin, Poland

We learn by doing. We learn mathematics by doing problems. And we learn more mathematics by doing more problems. If you want to hone your understanding of continuous and differentiable functions, this book contains hundreds of problems to help you do so. The emphasis here is on real functions of a single variable. *Topics include*: continuous functions, the intermediate value property, uniform continuity, mean value theorems, Taylor's formula, convex functions, sequences and series of functions. The book is mainly geared toward students studying the basic principles of analysis. However, given its selection of problems, organisation, and level, it would be an ideal choice for tutorial or problem-solving seminars, particularly those geared toward the Putnam exam. It is also suitable for self-study. *The presentation of the material is designed to help student comprehension, to encourage them to ask their own questions, and to start research. The collection of problems will also help teachers who wish to incorporate problems into their lectures*. The problems are grouped into sections according to the methods of solution. *Solutions for the problems are provided*. Problems in *Mathematical Analysis I and III* are available as Volumes 4 and 21 in the AMS series Student Mathematical Library.

Contents: Problems ◆ Limits and continuity ◆ Differentiation ◆ Sequences and series of functions ◆ Solutions ◆ Limits and continuity ◆ Differentiation ◆ Sequences and series of functions ◆ *Bibliography* ◆ *Index*

2009	416 pp	Paperback
978–0–8218–4855–5		₹1,840.00

Problems in Mathematical Analysis III: Integration

AMS

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M T Nowak
Marie Curie–Sklodowska University, Lublin, Poland

The best way to penetrate the subtleties of the theory of integration is by solving problems. This book, like its two predecessors, is a wonderful source of interesting and challenging problems. As a resource, it is unequaled. *It offers a much richer*

selection than is found in any current textbook. Moreover, the book includes a complete set of solutions. This is the third volume of Problems in Mathematical Analysis. The topic here is integration for real functions of one real variable. The *first chapter* is devoted to the Riemann and the Riemann–Stieltjes integrals. *Chapter 2* deals with Lebesgue measure and integration. The authors include some famous, and some not so famous, inequalities related to Riemann integration. Many of the problems for Lebesgue integration concern convergence theorems and the interchange of limits and integrals. The book closes with a section on Fourier series, with a concentration on Fourier coefficients of functions from particular classes and on basic theorems for convergence of Fourier series. *The book is mainly geared toward students studying the basic principles of analysis*. However, given its selection of problems, organisation, and level, it would be an *ideal choice for tutorial or problem-solving seminars*, particularly those geared toward the Putnam exam. It is also suitable for self-study. The presentation of the material is designed to help student comprehension, to encourage them to ask their own questions, and to start research. The collection of problems will also help teachers who wish to incorporate problems into their lectures. The problems are grouped into sections according to the methods of solution. *Solution for the problems are provided. Problems in Mathematical Analysis I and II* are available as Volumes 4 and 12 in the AMS series Student Mathematical Library.

Contents: Problems ◆ The Riemann-Stieltjes integral ◆ The Lebesgue integral ◆ Solutions ◆ The Riemann-Stieltjes integral ◆ The Lebesgue integral ◆ *Bibliography* ◆ *Index*

2009	**368 pp**	**Paperback**
978–0–8218–4853–1		**₹ 1,560.00**

Problems in Real and Complex Analysis

Bernard R Gelbaum

This book builds upon the earlier volume Problems in Analysis, more than doubling it with a new section of problems on complex analysis. The problems on real analysis from the earlier book have all been checked, and stylistic, typographical, and mathematical errors have been corrected. The problems in complex analysis cover most of the principal topics in the theory of functions of a complex variable. The problems in the book cover, in real analysis: set algebra, measure and topology, real- and complex-valued functions, and topological vector spaces; in complex analysis: polynomials and power series, functions holomorphic in a region, entire functions, analytic continuation, singularities, harmonic functions, families of functions, and convexity theorems.

2010	**520 pp**	**Paperback**
978–81–8489–627–5		**₹ 1,350.00**

Real Analysis

AMS

Frank Morgan
Williams College, Williamstown, USA

Real Analysis builds the theory behind the calculus directly from the basic concepts of real numbers, limits and open and closed sets of in Rn. It gives the three characterizations of continuity: via epsilon-delta, sequences, and open sets. It gives three characterizations of compactness: as "closed and bounded," via sequences, and via open covers. Topics include Fourier series, the Gamma function, metric spaces, and Ascoli's Theorem.

The text not only provides efficient proofs, but also shows students how to come up with them. The excellent exercises come with select solutions in the back. Here is a real analysis text that is short enough for the student to read and understand and complete enough to be the primary text for a serious undergraduate course.

Contents: *Part I:* Real numbers and limits ◆ Numbers and logic ◆ Infinity ◆ Sequences ◆ Functions and limits ◆ *Part II:* Topology ◆ Open and closed sets ◆ Continuous functions ◆ Composition of functions ◆ Subsequences ◆ Compactness ◆ Existence of maximum ◆ Uniform continuity ◆ Connected sets and the intermediate value theorem ◆ The Cantor set and fractals ◆ *Part III:* Calculus ◆ The derivative and the mean value theorem ◆ The Riemann integral ◆ The fundamental theorem of calculus ◆ Sequences of functions ◆ The Lebesgue theory ◆ Infinite series Σ a to n ◆ Absolute convergence ◆ Power series ◆ Fourier series ◆ Strings and springs ◆ Convergence of Fourier series ◆ The exponential function ◆ Volumes

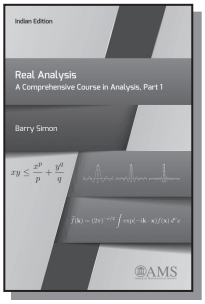
of n-balls and the gamma function ⌖ *Part IV:* Metric spaces ⌖ Metric spaces ⌖ Analysis on metric spaces ⌖ Compactness in metric spaces ⌖ Ascoli's theorem ⌖ Partial solutions to exercises ⌖ *Greek letters* ⌖ *Index*

2010	160 pp	Paperback
978-0-8218-5222-4		₹ 1,170.00

Real Analysis: A Comprehensive Course in Analysis, Part I

AMS

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 1 is devoted to real analysis. From one point of view, it presents the infinitesimal calculus of the twentieth century with the ultimate integral calculus (measure theory) and the ultimate differential calculus (distribution theory). From another, it shows the triumph of abstract spaces: topological spaces, Banach and Hilbert spaces, measure spaces, Riesz spaces, p Polish spaces, locally convex spaces, Fréchet spaces, Schwartz space, and L spaces. Finally it is the study of big techniques, including the Fourier series and transform, dual spaces, the Baire category, fixed point theorems, probability ideas, and Hausdorff dimension. Applications include the constructions of nowhere differentiable functions, Brownian motion, space-filling curves, solutions of the moment problem, Haar measure, and equilibrium measures in potential theory.

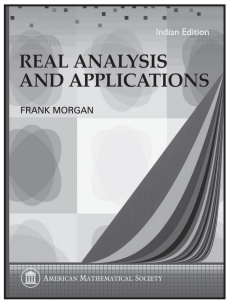
See also: Advanced complex analysis, Basic complex analysis, Harmonic analysis

2017	812 pp	Paperback
978-1-4704-3775-6		₹ 2,580.00

Real Analysis and Applications: Including Fourier Series and the Calculus of Variations

AMS

Frank Morgan
Williams College, Williamstown, USA



Real Analysis and Applications starts with a streamlined, but complete, approach to real analysis. It finishes with a wide variety of applications in Fourier series and the calculus ofvariations, including minimal surfaces, physics, economics, Riemannian geometry, and general relativity. The basic theory includes all the standard topics: limits of sequences, topology, compactness, the Cantor set and fractals, calculus with the Riemann integral, a chapter on the Lebesgue theory, sequences of functions, infinite series, and the exponential and Gamma functions.

The applications conclude with a computation of the relativistic precession of Mercury's orbit, which Einstein called "convincing proof of the correctness of the theory [of General Relativity]."

The text not only provides clear, logicalproofs, but also shows the student how to derive them. *The excellent exercises come with select solutions in the back. This is a text that makes it possible to do the full theory and significant applications in one semester. Frank Morgan is the author of six books and over one hundred articles on mathematics.*

He is an inaugural recipient of the Mathematical Association of America's national Haimo award for excellence in teaching. With this applied version of his Real Analysis text, Morgan

brings his famous direct style to the growing numbers of potential mathematics majors who want to see applications along with the theory. The book is suitable for undergraduates interested in real analysis.

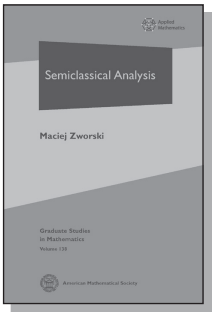
Contents: Real numbers and limits ◆ Topology ◆ Calculus ◆ Fourier series ◆ The calculus of variations ◆ *Index*

2012	**208 pp**	**Paperback**
978-0-8218-9185-8		**₹ 1,320.00**

Semiclassical Analysis

AMS

Maciej Zworski
University of California, Berkeley, USA



Semiclassical analysis provides PDE techniques based on the classical-quantum (particle-wave) correspondence. These techniques include such well-known tools as geometric optics and the Wentzel-Kramers-Brillouin approximation. Examples of problems studied in this subject are high energy eigenvalue asymptotics and effective dynamics for solutions of evolution equations. From the mathematical point of view, semiclassical analysis is a branch of microlocal analysis which, broadly speaking, applies harmonic analysis and symplectic geometry to the study of linear and nonlinear PDE. The book is intended to be a graduate level text introducing readers to semiclassical and microlocal methods in PDE. It is augmented in later chapters with many specialized advanced topics which provide a link to current research literature.

Contents: *Preface* ◆ Chapter 1. Introduction ◆ Basic themes ◆ Classical and quantum mechanics ◆ Overview ◆ Notes ◆ Part 1. BASIC THEORY ◆ Chapter 2. Symplectic geometry and analysis ◆ Flows ◆ Symplectic structure on R2n ◆ Symplectic mappings ◆ Hamiltonian vector fields ◆ Lagrangian submanifolds ◆ *Notes* ◆ Chapter 3. Fourier transform, stationary phase ◆ Fourier transform on S ◆ Fourier transform on S ◆ Semiclassical Fourier transform ◆ Stationary phase in one dimension ◆ Stationary phase in higher dimensions ◆ Oscillatory integrals ◆ Notes ◆ Chapter 4. Semiclassical quantization ◆ Definitions ◆ Quantization formulas ◆ Composition, asymptotic expansions ◆ Symbol classes ◆ Operators on L2 ◆ Compactness ◆ Inverses, Garding inequalities ◆ *Notes* ◆ Part 2. APpLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS ◆ Chapter 5. Semiclassical defect measures ◆ Construction, examples ◆ Defect measures and PDE ◆ Damped wave equation ◆ *Notes* ◆ Chapter 6. Eigenvalues and eigenfunctions ◆ The harmonic oscillator ◆ Symbols and eigenfunctions ◆ Spectrum and resolvents ◆ Weyl's Law ◆ *Notes* ◆ Chapter 7. Estimates for solutions of PDE ◆ Classically forbidden regions ◆ Tunneling ◆ Order of vanishing ◆ L∞ estimates for quasimodes ◆ Schauder estimates ◆ *Notes* ◆ Part 3. ADVANCED THEORY AND APpLICATIONS Chapter 8. More on the symbol calculus ◆ Beals's Theorem ◆ Real exponentiation of operators ◆ Generalized Sobolev spaces ◆ Wavefront sets, essential support, and microlocality ◆ *Notes* ◆ Chapter 9. Changing variables ◆ Invariance, half-densities ◆ Changing symbols ◆ Invariant symbol classes ◆ *Notes* ◆ Chapter 10. Fourier integral operators ◆ Operator dynamics ◆ An integral representation formula ◆ Strichartz estimates ◆ Lp estimates for quasimodes ◆ *Notes* ◆ Chapter 11. Quantum and classical dynamics ◆ Egorov's Theorem ◆ Quantizing symplectic mappings ◆ Quantizing linear symplectic mappings ◆ Egorov's Theorem for longer times ◆ *Notes* ◆ Chapter 12. Normal forms ◆ Overview ◆ Normal forms: real symbols ◆ Propagation of singularities ◆ Normal forms: complex symbols ◆ Quasimodes, pseudospectra ◆ *Notes* ◆ Chapter 13. The FBI transform ◆ Motivation ◆ Complex analysis ◆ FBI transforms and Bergman kernels ◆ Quantization and Toeplitz operators ◆ Applications ◆ *Notes* ◆ Part 4. SEMICLASSICAL ANALYSIS ON MANIFOLDS Chapter 14. Manifolds ◆ Definitions, examples ◆ Pseudodifferential operators on manifolds ◆ Schrodinger operators on manifolds ◆ *Notes* ◆ Chapter 15. Quantum ergodicity ◆ Classical ergodicity ◆ A weak Egorov Theorem ◆ Weyl's Law generalized ◆ Quantum ergodic theorems ◆ *Notes* ◆ Part 5. APpENDICES *Appendix A. Notation* ◆ *A.1. Basic notation* ◆ *A.2. Functions, differentiation* ◆ *A.3. Operators* ◆ *A.4. Estimates* ◆

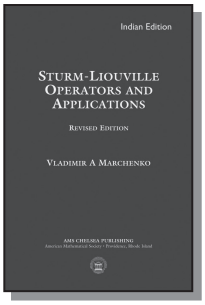
A.5. Symbol classes ◆ Appendix B. Differential forms ◆ B.1. Definitions ◆ B.2. Push-forwards and pull-backs ◆ B.3. Poincare's Lemma ◆ B.4. Differential forms on manifolds ◆ Appendix C. Functional analysis ◆ C.1. Operator theory ◆ C.2. Spectral theory ◆ C.3. Trace class operators ◆ Appendix D. Fredholm theory ◆ D.1. Grushin problems ◆ D.2. Fredholm operators ◆ D.3. Meromorphic continuation ◆ Bibliography ◆ Index

2016	448 pp	Paperback
978-1-4704-2584-5		₹ 1,670.00

Sturm–Liouville Operators and Applications

AMS

Vladimir A Marchenko
Verkin Institute for Low Temperature Physics and Engineering, Kharkov, Ukraine
Translated by A Iacob



The spectral theory of Sturm–Liouville operators is a classical domain of analysis, comprising a wide variety of problems. Besides the basic results on the structure of the spectrum and the eigenfunction expansion of regular and singular Sturm–Liouville problems, it is in this domain that one-dimensional quantum scattering theory, inverse spectral problems, and the surprising connections of the theory with nonlinear evolution equations first become related. The main goal of this book is to show what can be achieved with the aid of transformation operators in spectral theory as well as in their applications. The main methods and results in this area (many of which are credited to the author) are for the first time examined from a unified point of view.

The direct and inverse problems of spectral analysis and the inverse scattering problem are solved with the help of the transformation operators in both self adjoint and nonself-adjoint cases. The asymptotic formulae for spectral functions, trace formulae and the exact relation (in both directions) between the smoothness of potential and the asymptotics of eigenvalues (or the lengths of gaps in the spectrum) are obtained. Also, the applications of transformation operators and their generalizations to soliton theory (that is, solving nonlinear equations of Korteweg-de Vries type) are considered.

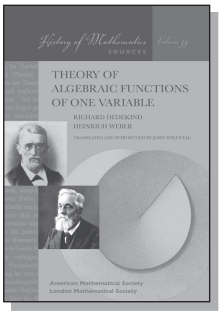
The new Chapter 5 is devoted to the stability of the inverse problem solutions. The estimation of the accuracy with which the potential of the Sturm–Liouville operator can be restored from the scattering data or the spectral function, if they are only known on a finite interval of a spectral parameter (that is, on a finite interval of energy), is obtained.

2017	412 pp	Paperback
978-1-4704-3834-0		₹ 1,855.00

Theory of Algebraic Functions of One Variable

AMS

Richard Dedekind & Heinrich Weber
Translated and introduced by John Stillwell



This book is the first English translation of the classic long paper Theorie der Algebraischen Functionen Einer Veränderlichen (Theory of Algebraic Functions of One Variable), published by Dedekind and Weber in 1882. The translation, introduction, and commentary provide the first easy access to this important paper for a wide mathematical audience: students, historians of mathematics, and professional mathematicians. Why is the Dedekind-Weber paper important? In the 1850s, Riemann initiated a revolution in algebraic geometry by interpreting algebraic curves as surfaces covering the sphere. He obtained deep and striking results in pure algebra

by intuitive arguments about surfaces and their topology. However, Riemann's arguments were not rigorous, and they remained in limbo until 1882, when Dedekind and Weber put them on a sound foundation. The key to this breakthrough was to develop the theory of algebraic functions in analogy with Dedekind's theory of algebraic numbers, where the concept of ideal plays a central role. By introducing such concepts into the theory of algebraic curves, Dedekind and Weber paved the way for modern algebraic geometry.

Contents: *Preface* ◆ *Translator's Introduction* ◆ Overview ◆ From Calculus to Abel's Theory of Algebraic Curves ◆ Riemann's Theory of Algebraic Curves ◆ The Riemann-Hurwitz Formula ◆ Functions on Riemann Surfaces ◆ Later Development of Analysis on Riemann Surfaces ◆ Origins of Algebraic Number Theory ◆ Dedekind's Theory of Algebraic Integers ◆ Number Fields and Function Fields ◆ Algebraic Functions and Riemann Surfaces ◆ From Points to Valuations ◆ Reading the Dedekind-Weber Paper ◆ Conclusion Theory of Algebraic Functions of One Variable Introduction ◆ Part I: Fields of algebraic functions ◆ Norm, trace, and discriminant ◆ The system of integral algebraic functions of z in the field Ω ◆ Modules of functions ◆ Congruences ◆ The norm of one module relative to another ◆ The ideals in o ◆ Multiplication and division of ideals ◆ Laws of divisibility of ideals ◆ Complementary bases of the field Ω ◆ The ramification ideal ◆ The fractional functions of z in the field Ω ◆ Rational transformations of functions in the field Ω Part II ◆ The points of the Riemann surface ◆ The order numbers ◆ Conjugate points and conjugate values ◆ Representing the functions in the field Ω by polygon quotients ◆ Equivalent polygons and polygon classes ◆ Vector spaces of polygons ◆ Lowering the dimension of the space by divisibility conditions ◆ The dimensions of polygon classes ◆ The normal bases of o ◆ The differential quotient ◆ The genus of the field Ω ◆ The differentials in Ω ◆ Differentials of the first kind ◆ Polygon classes of the first and second kind ◆ The Riemann-Roch theorem for proper classes ◆ The Riemann-Roch theorem for improper classes of the first kind ◆ Improper classes of the second kind ◆ Differentials of the second and third kinds 32. Residues ◆ Relations between differentials of the first and second kinds ◆ *Bibliography* ◆ *Index*

2016	**160 pp**	**Paperback**
978–1–4704–2590–6		**₹ 1,170.00**

Analytic Number Theory

Analytic Number Theory

AMS

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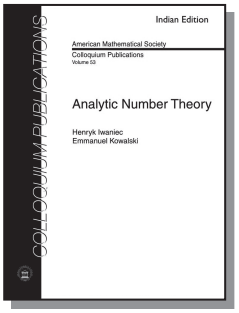


Analytic Number Theory distinguishes itself by the variety of tools it uses to establish results. One of the primary attractions of this theory is its vast diversity of concepts and methods. *The main goals of this book are to show the scope of the theory, both in classical and modern directions, and to exhibit its wealth and prospects, beautiful theorems, and powerful techniques.*

The book is written with graduate students in mind, and the authors nicely balance clarity, completeness, and generality. The exercises in each section serve dual purposes, some intended to improve readers' understanding of the subject and others providing additional information. Formal prerequisites for the major part of the book do not go beyond calculus, complex analysis, integration, and Fourier series and integrals. In later chapters automorphic forms become important, with much of the necessary information about them included in two survey chapters.

Contents: Introduction ◆ Arithmetic functions ◆ Elementary theory of prime numbers ◆ Characters ◆ Summation formulas ◆ Classical analytic theory of L-functions ◆ Elementary sieve methods ◆ Bilinear forms and the large sieve ◆ Exponential sums ◆ The Dirichlet polynomials ◆ Zerodensity estimates ◆ Sums over finite fields ◆ Character sums ◆ Sums over primes ◆ Holomorphic modular forms ◆ Spectral theory of automorphic forms ◆ Sums of Kloosterman sums ◆

Primes in arithmetic progressions ◆ The least prime in an arithmetic progression ◆ The Goldbach problem ◆ The circle method ◆ Equidistribution ◆ Imaginary quadratic fields ◆ Effective bounds for the class number ◆ The critical zeros of the Riemann zeta function ◆ The spacing of zeros of the Riemann zeta-function ◆ Central values of L-functions ◆ *Bibliography* ◆ *Index*

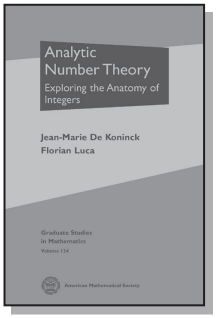
2012	632 pp	Paperback
978–0–8218–8710–3		₹ 1,570.00

Analytic Number Theory: Exploring the Anatomy of Integers

AMS

Jean–Marie De Koninck
Université Laval, Quebec, Canada

Florian Luca
Universidad Nacional Autonoma de México, Morelia, Michoacan, México



The authors assemble a fascinating collection of topics from analytic number theory that provides an introduction to the subject with a very clear and unique focus on the anatomy of integers, that is, on the study of the multiplicative structure of the integers. Some of the most important topics presented are the global and local behavior of arithmetic functions, an extensive study of smooth numbers, the Hardy-Ramanujan and Landau theorems, characters and the Dirichlet theorem, the abc conjecture along with some of its applications, and sieve methods. The book concludes with a whole chapter on the index of composition of an integer. One of this book's best features is the collection of problems at the end of each chapter that have been chosen carefully to reinforce the material. The authors include solutions to the even-numbered problems, making this volume very appropriate for readers who want to test their understanding of the theory presented in the book.

Contents: *Preface* ◆ *Notation* ◆ *Frequently Used Functions* ◆ Chapter 1. Preliminary Notions ◆ Approximating a sum by an integral ◆ The Euler-MacLaurin formula ◆ The Abel summation formula ◆ Stieltjes integrals ◆ Slowly oscillating functions ◆ Combinatorial results ◆ The Chinese Remainder Theorem ◆ The density of a set of integers ◆ The Stirling formula ◆ Basic inequalities Problems on Chapter 1 ◆ Chapter 2. Prime Numbers and Their Properties ◆ Prime numbers and their polynomial representations ◆ There exist infinitely many primes ◆ A first glimpse at the size of $\pi(x)$ ◆ Fermat numbers ◆ A better lower bound for $\pi(x)$ ◆ The Chebyshev estimates ◆ The Bertrand Postulate ◆ The distance between consecutive primes ◆ Mersenne primes ◆ Conjectures on the distribution of prime numbers Problems on Chapter 2 ◆ Chapter 3. The Riemann Zeta Function ◆ The definition of the Riemann Zeta Function ◆ Extending the Zeta Function to the half-plane $\sigma > 0$ ◆ The derivative of the Riemann Zeta Function ◆ The zeros of the Zeta Function ◆ Euler's estimate $\zeta(2) = \pi 2/6$ Problems on Chapter 3 ◆ Chapter 4. Setting the Stage for the Proof of the Prime Number Theorem ◆ Key functions related to the Prime Number Theorem ◆ A closer analysis of the functions $\theta(x)$ and $\psi(x)$ ◆ Useful estimates ◆ The Mertens estimate ◆ The Mobius function ◆ The divisor function Problems on Chapter 4 ◆ Chapter 5. The Proof of the Prime Number Theorem ◆ A theorem of D. J. Newman ◆ An application of Newman's theorem ◆ The proof of the Prime Number Theorem ◆ A review of the proof of the Prime Number Theorem ◆ The Riemann Hypothesis and the Prime Number Theorem ◆ Useful estimates involving primes ◆ Elementary proofs of the Prime Number Theorem Problems on Chapter 5 ◆ Chapter 6. The Global Behavior of Arithmetic Functions ◆ Dirichlet series and arithmetic functions ◆ The uniqueness of representation of a Dirichlet series ◆ Multiplicative functions ◆ Generating functions and Dirichlet products ◆ Wintner's theorem ◆ Additive functions ◆ The average orders of $\omega(n)$ and $\Omega(n)$ ◆ The average order of an additive function ◆ The Erd˝os-Wintner theorem Problems on Chapter 6 ◆ Chapter 7. The Local Behavior of Arithmetic Functions ◆ The normal order of an arithmetic function ◆ The Tur´an-Kubilius inequality ◆ Maximal order of the divisor function ◆ An upper bound for $d(n)$ ◆ Asymptotic densities ◆ Perfect numbers ◆ Sierpinski, Riesel, and Romanov ◆ Some open problems of an elementary

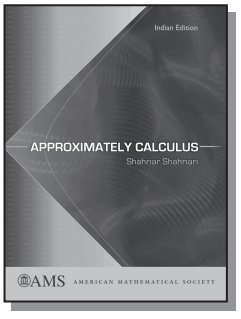
nature Problems on Chapter 7 ◆ Chapter 8. The Fascinating Euler Function ◆ The Euler function ◆ Elementary properties of the Euler function ◆ The average order of the Euler function ◆ When is $\phi(n)\sigma(n)$ a square? ◆ The distribution of the values of $\phi(n)/n$ ◆ The local behavior of the Euler function Problems on Chapter 8 ◆ Chapter 9. Smooth Numbers ◆ Notation ◆ The smallest prime factor of an integer ◆ The largest prime factor of an integer ◆ The Rankin method ◆ An application to pseudoprimes ◆ The geometric method ◆ The best known estimates on $\Psi(x, y)$ ◆ The Dickman function ◆ Consecutive smooth numbers Problems on Chapter 9 ◆ Chapter 10. The Hardy-Ramanujan and Landau Theorems ◆ The Hardy-Ramanujan inequality ◆ Landau's theorem Problems on Chapter 10 ◆ Chapter 11. The abc Conjecture and Some of Its Applications ◆ The abc conjecture ◆ The relevance of the condition $\varepsilon > 0$ ◆ The Generalized Fermat Equation ◆ Consecutive powerful numbers ◆ Sums of k-powerful numbers ◆ The Erdos-Woods conjecture ◆ A problem of Gandhi ◆ The k-abc conjecture Problems on Chapter 11 ◆ Chapter 12. Sieve Methods ◆ The sieve of Eratosthenes ◆ The Brun sieve ◆ Twin primes ◆ The Brun combinatorial sieve ◆ A Chebyshev type estimate ◆ The Brun-Titchmarsh theorem ◆ Twin primes revisited ◆ Smooth shifted primes ◆ The Goldbach conjecture ◆ The Schnirelman theorem ◆ The Selberg sieve ◆ The Brun-Titchmarsh theorem from the Selberg sieve ◆ The Large sieve ◆ Quasi-squares ◆ The smallest quadratic nonresidue modulo p Problems on Chapter 12 ◆ Chapter 13. Prime Numbers in Arithmetic Progression ◆ Quadratic residues ◆ The proof of the Quadratic Reciprocity Law ◆ Primes in arithmetic progressions with small moduli ◆ The Primitive Divisor theorem ◆ Comments on the Primitive Divisor theorem Problems on Chapter 13 ◆ Chapter 14. Characters and the Dirichlet Theorem ◆ Primitive roots ◆ Characters ◆ Theorems about characters ◆ L-series ◆ $L(1, \chi)$ is finite if χ is a non-principal character ◆ The nonvanishing of $L(1, \chi)$: first step ◆ The completion of the proof of the Dirichlet theorem Problems on Chapter 14 ◆ Chapter 15. Selected Applications of Primes in Arithmetic Progression ◆ Known results about primes in arithmetical progressions ◆ Some Diophantine applications ◆ Primes p with $p - 1$ squarefree ◆ More applications of primes in arithmetic progressions ◆ Probabilistic applications Problems on Chapter 15 ◆ Chapter 16. The Index of Composition of an Integer ◆ Introduction ◆ Elementary results ◆ Mean values of λ and $1/\lambda$ ◆ Local behavior of $\lambda(n)$ ◆ Distribution function of $\lambda(n)$ ◆ Probabilistic results Problems on Chapter 16 ◆ *Appendix:* Basic Complex Analysis Theory ◆ Basic definitions ◆ Infinite products ◆ The derivative of a function of a complex variable ◆ The integral of a function along a path ◆ The Cauchy theorem ◆ The Cauchy integral formula Solutions to Even-Numbered Problems Solutions to problems from Chapter 1 ◆ Solutions to problems from Chapter ◆ Solutions to problems from Chapter 3 ◆ Solutions to problems from Chapter 4 ◆ Solutions to problems from Chapter 5 ◆ Solutions to problems from Chapter 6 ◆ Solutions to problems from Chapter 7 ◆ Solutions to problems from Chapter 8 ◆ Solutions to problems from Chapter 9 ◆ Solutions to problems from Chapter 10 ◆ Solutions to problems from Chapter 11 ◆ Solutions to problems from Chapter 12 ◆ Solutions to problems from Chapter 13 ◆ Solutions to problems from Chapter 14 ◆ Solutions to problems from Chapter 15 ◆ Solutions to problems from ◆ Chapter 16 ◆ *Bibliography* ◆ *Index*

2016	**432 pp**	**Paperback**
978–1–4704–2583–8		**₹ 1,670.00**

Approximately Calculus

AMS

Shahriar Shahriari
Pomona College, Claremont, USA



Is there always a prime number between n and 2n? Where, approximately, is the millionth prime? And just what does calculus have to do with answering either of these questions? It turns out that calculus has a lot to do with both questions, as this book can show you.

The theme of the book is approximations. Calculus is a powerful tool because it allows us to approximate complicated functions with simpler ones. Indeed, replacing a function locally with a linear–or higher order–approximation is at the heart of calculus. The real star of the book, though, is the task of approximating the number of primes

up to a number x. This leads to the famous Prime Number Theorem--and to the answers to the two questions about primes.

While emphasizing the role of approximations in calculus, most major topics are addressed, such as derivatives, integrals, the Fundamental Theorem of Calculus, sequences, series, and so on. However, our particular point of view also leads us to many unusual topics: curvature, Padé approximations, public key cryptography, and an analysis of the logistic equation, to name a few.

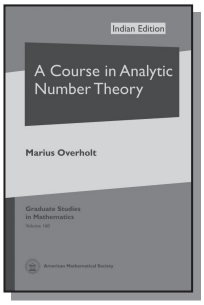
Contents: Patterns and induction ◆ Divisibility ◆ Primes ◆ Derivatives and approximations of functions ◆ Antiderivatives and integration ◆ Distribution of primes ◆ Log, exponential, and the inverse trigonometric functions ◆ The mean value theorem and approximations ◆ Linearization topics ◆ Defining integrals, areas, and arc lengths ◆ Improper integrals and techniques of integration ◆ The prime number theorem ◆ Local approximation of functions and integral estimations ◆ Sequences and series ◆ Power series and Taylor series ◆ More on series ◆ Limits of functions ◆ Differential equations ◆ Logical arguments ◆ Hints for selected problems ◆ *Bibliography* ◆ *Index*

2012	312 pp	Paperback
978-0-8218-8704-2		₹ 1,525.00

Course in Analytic Number Theory, A

AMS

Marius Overholt
University of Tromso, Tromso, Norway



This book is an introduction to analytic number theory suitable for beginning graduate students. It covers everything one expects in a first course in this field, such as growth of arithmetic functions, existence of primes in arithmetic progressions and the Prime Number Theorem. But it also covers more challenging topics that might be used in a second course, such as the Siegel–/Walfisz theorem, functional equations of L-functions, and the explicit formula of von Mangoldt. For students with an interest in Diophantine analysis, there is a chapter on the Circle Method and Waring's Problem. Those with an interest in algebraic number theory may find the chapter on the analytic theory of number fields of interest, with proofs of the Dirichlet unit theorem, the analytic class number formula, the functional equation of the Dedekind zeta function, and the Prime Ideal Theorem.

The exposition is both clear and precise, reflecting careful attention to the needs of the reader. The text includes extensive historical notes, which occur at the ends of the chapters. The exercises range from introductory problems and standard problems in analytic number theory to interesting original problems that will challenge the reader.

The author has made an effort to provide clear explanations for the techniques of analysis used. No background in analysis beyond rigorous calculus and a first course in complex function theory is assumed.

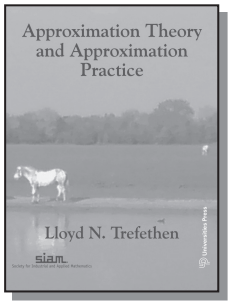
2017	392 pp	Paperback
978-1-4704-3730-5		₹ 1,770.00

Approximation Theory

Approximation Theory and Approximation Practice

AMS

Nick Trefethen
Oxford University, Oxford, UK



Approximation Theory and Approximation Practice is a textbook on classical polynomial and rational approximation theory for the twenty-first

century. It is aimed at advanced undergraduates and graduate students across all of applied mathematics.

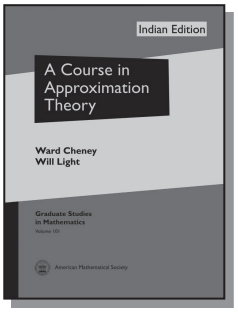
2017	320 pp	Paperback
978-93-86235-44-2		₹ 990.00

Course in Approximation Theory, A

AMS

Ward Cheney
University of Texas at Austin, USA

Will Light



This textbook is designed for graduate students in mathematics, physics, engineering, and computer science. Its purpose is to guide the reader in exploring contemporary approximation theory. The emphasis is on multi-variable approximation theory, i.e., the approximation of functions in several variables, as opposed to the classical theory of functions in one variable.

Most of the topics in the book, heretofore accessible only through research papers, are treated here from the basics to the currently active research, often motivated by practical problems arising in diverse applications such as science, engineering, geophysics, and business and economics. Among these topics are projections, interpolation paradigms, positive definite functions, interpolation theorems of Schoenberg and Micchelli, tomography, artificial neural networks, wavelets, thin-plate splines, box splines, ridge functions, and convolutions.

An important and valuable feature of the book is the bibliography of almost 600 items directing the reader to important books and research papers. There are 438 problems and exercises scattered through the book allowing the student reader to get a better understanding of the subject.

Contents: Introductory discussion of interpolation ◆ Linear interpolation operators ◆ Optimization of the Lagrange operator ◆ Multivariate polynomials ◆ Moving the nodes ◆ Projections ◆ Tensor-product interpolation ◆ The Boolean algebra of projections ◆ The Newton paradigm for interpolation ◆ The Lagrange paradigm for interpolation ◆ Interpolation by translates of a single function ◆ Positive definite functions ◆ Strictly positive definite functions ◆ Completely monotone functions ◆ The Schoenberg interpolation theorem ◆ The Micchelli interpolation theorem ◆ Positive definite functions on spheres ◆ Approximation by positive definite functions ◆ Approximate reconstruction of functions and tomography ◆ Approximation by convolution ◆ The good kernels ◆ Ridge functions ◆ Ridge function approximation via convolutions ◆ Density of ridge functions ◆ Artificial neural networks ◆ Chebyshev centers ◆ Optimal reconstruction of functions ◆ Algorithmic orthogonal projections ◆ Cardinal B-splines and the sinc function ◆ The Golomb-Weinberger theory ◆ Hilbert function spaces and reproducing kernels ◆ Spherical thin-plate splines ◆ Box splines ◆ Wavelets, I ◆ Wavelets, II ◆ Quasi-interpolation ◆ *Bibliography* ◆ *Index* ◆ *Index of symbols*

2012	376 pp	Paperback
978-0-8218-8711-0		₹ 1,600.00

Calculus

Differential Equations with Applications and Programs

S Balachandra Rao
Formerly Head, Department of Mathematics, National College, Bengaluru, India

H R Anuradha
Lecturer in Mathematics, V V S Firstgrade College for Women, Bengaluru, India

This book is designed to serve as a *textbook for undergraduate students of mathematics, physics, physical chemistry, engineering, etc.*

It also contains a *large number of worked examples besides exercises and answers.* A whole chapter is devoted to numerical techniques to solve differential equations in which computer programs and printouts of worked examples are included.

Contents: *Preface* ◆ Basic Concepts ◆ Differential Equation of First Order and First Degree ◆ Differential Equations of First Order and Higher Degree ◆

Orthogonal Trajectories ◆ Higher Order Linear Differential Equations (with constant coefficients) ◆ Cauchy-Euler Differential Equations ◆ Simultaneous Differential Equations (in two variables with constant coefficients) ◆ Second Order Differential Equations with Variable Coefficients ◆ Power Series Solutions of Different Equations ◆ Legendre's Equation and Polynomials ◆ Bessel's Differential Equation ◆ Total Differential Equations ◆ Simulation Total Differential Equations ◆ Laplace Transforms ◆ Fourier Series ◆ Numerical Solution of Differential Equations ◆ Answers to Exercises ◆ *Bibliography* ◆ *Index*

1996	**416 pp**	**Paperback**
978-81-7371-023-0		**₹ 985.00**

How to Enjoy Calculus

Eli S Pine

This book is an essential primer for anyone who wants to familiarise himself or herself with calculus. Unlike other books on this subject, it is easy for anyone from any discipline to understand it. For too long this subject has been rendered mysterious and obscure. With this book, calculus is demystified and can be easily grasped. This book also acts as a stepping-stone and enables you to go on to read other books on calculus with ease.

2002	**136 pp**	**Paperback**
978-81-7371-406-1		**₹ 475.00**

Second Year Calculus: From Celestial Mechanics to Special Relativity

David M Bressoud

Second Year Calculus: From Celestial Mechanics to Special Relativity covers multi-variable and vector calculus, emphasizing the historical physical problems which gave rise to the concepts of calculus. The book guides us from the birth of the mechanized view of the world in *Isaac Newton's Mathematical Principles of Natural Philosophy* in which mathematics becomes the ultimate tool for modelling physical reality, to the dawn of a radically new and often counter-intuitive age in *Albert Einstein's Special Theory of Relativity* in which it is the mathematical model which suggests new aspects of that reality. The development of this process is discussed from the modern viewpoint of differential forms. Using this concept, the student learns to compute orbits and rocket trajectories, model flows and force fields, and derive the laws of electricity and magnetism. *These exercises and observations of mathematical symmetry enable the student to better understand the interaction of physics and mathematics.*

Contents: F = ma ◆ Vector Algebra ◆ Celestial Mathematics ◆ Differential Forms ◆ Line Integrals, Multiple Integrals ◆ Linear Transformations ◆ Differential Calculus ◆ Integration by Pullback ◆ Techniques of Differential Calculus ◆ The Fundamental Theorem ◆ $E=mc^2$

2010	**416 pp**	**Paperback**
978-81-8489-622-0		**₹ 1,110.00**

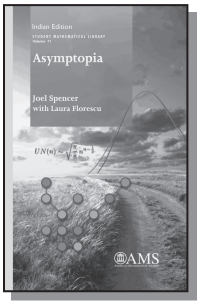
Combinatorics

Asymptopia

AMS

Joel Spencer, Laura Florescu

New York University, NY



Asymptotics in one form or another are part of the landscape for every mathematician. The objective of this book is to present the ideas of how to approach asymptotic problems that arise in discrete mathematics, analysis of algorithms, and number theory. A broad range of topics is covered, including distribution of prime integers, Erdõs Magic, random graphs, Ramsey numbers, and asymptotic geometry.

The author is a disciple of Paul Erdõs, who taught him about Asymptopia. Primes less than n, graphs with v vertices, random walks of t steps—Erdõs was fascinated by the limiting behaviour as the variables approached, but never reached, infinity. Asymptotics is very much an art.

The various functions all have distinct personalities. Erdõs knew these functions as personal friends. It is the author's hope that

these insights may be passed on, that the reader may similarly feel which function has the right temperament for a given task. This book is aimed at strong undergraduates, though it is also suitable for particularly good high school students or for graduates wanting to learn some basic techniques.

2017	200 pp	Paperback
978-1-4704-3843-2		₹ 1,255.00

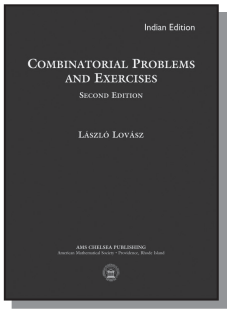
Combinatorial Problems and Exercises

AMS

(Second Edition)

László Lovász

Eötvös Loránd University, Budapest, Hungary



The main purpose of this book is to provide help in learning existing techniques in combinatorics. The most effective way of learning such techniques is to solve exercises and problems. This book presents all the material in the form of problems and series of problems (apart from some general comments at the beginning of each chapter). In the second part, a hint is given for each exercise, which contains the main idea necessary for the solution, but allows the reader to practice the techniques by completing the proof. In the third part, a full solution is provided for each problem.

This book will be useful to those students who intend to start research in graph theory, combinatorics or their applications, and for those researchers who feel that combinatorial techniques might help them with their work in other branches of mathematics, computer science, management science, electrical engineering and so on. For background, only the elements of linear algebra, group theory, probability and calculus are needed.

Contents: Problems ◆ Hints ◆ Solutions ◆ Dictionary of the combinatorial phrases and concepts used ◆ Notation ◆ *Index of the abbreviations of textbooks and monographs* ◆ *Subject index* ◆ *Author index* ◆ *Errata*

2012	640 pp	Paperback
978-0-8218-8708-0		₹ 1,570.00

Formal Groups and Applications

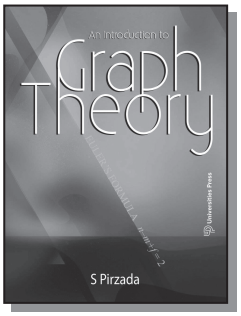
Michiel Hazewinkel

See page 9

Introduction to Graph Theory, An

S Pirzada

Professor, Department of Mathematics, University of Kashmir, Srinagar, India



In this comprehensive and up-to-date book on graph theory, the reader is provided a thorough understanding of the fundamentals of the subject - the structure of graphs, the techniques used to analyse problems in graph theory, and the use of graph-theoretical algorithms in mathematics, engineering and computer science. Many topics, not generally found in standard books, are described here. These include new proofs of various classical theorems, signed degree sequences, criteria for graphical sequences, eccentric sequences, matching and decomposition of planar graphs into trees, and scores in digraphs.

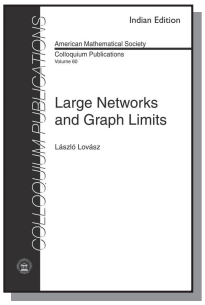
Contents: Introduction ◆ Degree Sequences ◆ Eulerian and Hamiltonian Graphs ◆ Trees ◆ Connectivity ◆ Planarity ◆ Colourings ◆ Matchings and Factors ◆ Edge Graphs and Eccentricity Sequences ◆ Graph Matrices ◆ Digraphs ◆ Score Structure in Digraphs ◆ *References* ◆ *Index*

2012	404 pp	Paperback
978-81-7371-760-4		₹ 775.00

Large Networks and Graph Limits

AMS

László Lovász
Eötvös Loránd University, Budapest, Hungary



Recently, it became apparent that a large number of the most interesting structures and phenomena of the world can be described by networks. Developing a mathematical theory of very large networks is an important challenge. This book describes one recent approach to this theory, the limit theory of graphs, which has emerged over the last decade. The theory has rich connections with other approaches to the study of large networks, such as 'property testing' in computer science and regularity partition in graph theory. It has several applications in extremal graph theory, including the exact formulations and partial answers to very general questions, such as which problems in extremal graph theory are decidable. It also has less obvious connections with other parts of mathematics (classical and non-classical, like probability theory, measure theory, tensor algebras, and semidefinite optimisation).

This book explains many of these connections, first at an informal level to emphasise the need to apply more advanced mathematical methods, and then gives an exact development of the algebraic theory of graph homomorphisms and of the analytic theory of graph limits.

2017	496 pp	Paperback
978-1-4704-3836-4		₹ 1,935.00

Mutually Beneficial Relationship of Graphs and Matrices, The

AMS

Richard A Brualdi
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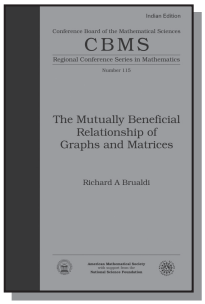


Graphs and matrices enjoy a fascinating and mutually beneficial relationship. This interplay has benefitted both graph theory and linear algebra. In one direction, knowledge about one of the graphs that can be associated with a matrix can be used to illuminate matrix properties and to get better information about the matrix. Examples include the use of digraphs to obtain strong results on diagonal dominance and eigenvalue inclusion regions and the use of the Rado–Hall theorem to deduce properties of special classes of matrices. Going the other way, linear algebraic properties of one of the matrices associated with a graph can be used to obtain useful combinatorial information about the graph. The adjacency matrix and the Laplacian matrix are two well-known matrices associated to a graph, and their eigenvalues encode important information about the graph. Another important linear algebraic invariant associated with a graph is the Colin de Verdière number, which, for instance, characterises certain topological properties of the graph.

This book is not a comprehensive study of graphs and matrices. The particular content of the lectures was chosen for its accessibility, beauty and current relevance, and for the possibility of enticing the audience to want to learn more.

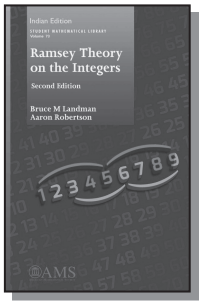
2017	112 pp	Paperback
978-1-4704-3722-0		₹ 1,300.00

Ramsey Theory on the Integers (Second Edition)

AMS

Bruce M Landman
University of West Georgia, Carrollton, GA

Aaron Robertson
Colgate University, Hamilton, NY



Ramsey theory is the study of the structure of mathematical objects that is preserved under partitions. In its full generality, Ramsey theory is quite powerful, but can quickly become complicated. By limiting the focus of this book to Ramsey theory applied to the set of integers, the authors have produced a gentle, but meaningful, introduction to an important and enticing branch of modern mathematics. This offers students a glimpse into the world of mathematical research and the opportunity for them to begin pondering unsolved problems.

For this new edition, several sections have been added and others have been significantly updated. Among the newly introduced topics are: rainbow Ramsey theory, an 'inequality' version of Schur's theorem, monochromatic solutions of recurrence relations, Ramsey results involving both sums and products, monochromatic sets avoiding certain differences, Ramsey properties for polynomial progressions, generalizations of the Erd s–Ginzberg–Ziv theorem, and the number of arithmetic progressions under arbitrary colourings.

Many new results and proofs have been added, most of which were not known when the first edition was published. Furthermore, the book's tables, exercises, lists of open research problems and bibliography have all been significantly updated.

This innovative book also provides the first cohesive study of Ramsey theory on the integers. It contains perhaps the most substantial account of solved and unsolved problems in this blossoming subject. This breakthrough book will engage students, teachers and researchers alike.

2017	**408 pp**	**Paperback**
978–1–4704–3844–9		**₹ 1,855.00**

Complex Analysis

A Course in Complex Analysis and Riemann Surfaces

PRINT ON DEMAND

Wilhelm Schlag
University of Chicago, Chicago, IL, USA

Complex analysis is a cornerstone of mathematics, making it an essential element of any area of study in graduate mathematics. Schlag's treatment of the subject emphasizes the intuitive geometric underpinnings of elementary complex analysis that naturally lead to the theory of Riemann surfaces.

The book begins with an exposition of the basic theory of holomorphic functions of one complex variable. The first two chapters constitute a fairly rapid, but comprehensive course in complex analysis. The third chapter is devoted to the study of harmonic functions on the disk and the half-plane, with an emphasis on the Dirichlet problem. Starting with the fourth chapter, the theory of Riemann surfaces is developed in some detail and with complete rigor. From the beginning, the geometric aspects are emphasized and classical topics such as elliptic functions and elliptic integrals are presented as illustrations of the abstract theory. The special role of compact Riemann surfaces is explained, and their connection with algebraic equations is established. The book concludes with three chapters devoted to three major results: the Hodge decomposition theorem, the Riemann-Roch theorem, and the uniformization theorem. These chapters present the core technical apparatus of Riemann surface theory at this level.

This text is intended as a detailed, yet fast-paced intermediate introduction to those parts of the theory of one complex variable that seem most useful in other areas of mathematics, including geometric group theory, dynamics, algebraic geometry, number theory, and functional analysis. More than seventy figures serve to illustrate concepts and ideas, and the many problems at the end of each chapter give the reader ample opportunity for practice and independent study.

Contents: *Preface* ◆ From i to z : The basics of complex analysis ◆ From z to the Riemann mapping theorem: Some finer points of basic complex

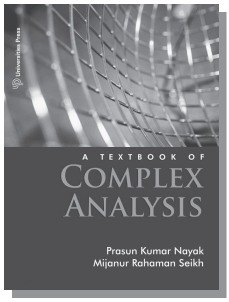
analysis ◆ Harmonic functions ◆ Riemann surfaces: Definitions, examples, basic properties ◆ Analytic continuation, covering surfaces, and algebraic functions ◆ Differential forms on Riemann surfaces ◆ The theorems of Riemann-Roch, Abel, and Jacobi ◆ Uniformization ◆ *Appendix A. Review of some basic background materia* ◆ *Bibliography* ◆ *Index*

2020	400 pp	Paperback
978–14–704–547–22		₹ 1,410.00

A Textbook of Complex Analysis

Prasun Kumar Nayak
Assistant Professor, Department of Mathematics, Midnapore College, West Bengal

Mijanur Rahaman Seikh
Assistant Professor, Department of Mathematics, Kazi Nazrul University, Asansol, West Bengal



This book is a comprehensive resource for students of undergraduate and postgraduate courses in mathematics, physics and engineering. It makes use of numerous worked-out examples to show how the study of complex numbers and their derivatives and properties helps in solving many physical problems. Beginning with the algebraic and analytic properties of complex numbers, the reader is introduced to topological notions of sets in the complex plane, sequence and series representation of complex numbers, limit, continuity and differentiability of complex functions, and branch cut and branch points in multi-valued functions. Important theorems such as Ascoli–Arzela theorem, Montel's theorem, Riemann mapping theorem, and the concept of Schawarz–Cristoffel transformations, widely used in various fields, are established. The notion of entire functions and their properties and direct and indirect analytic continuation of an analytic function, too, are covered.

The book contains an interesting range of chapter-end review exercises that will be of help to students and teachers alike. The inclusion of multiple-choice questions, in particular, will be of interest to those preparing for competitive examinations such as the NET, SET and GATE.

Salient features:
- Many solved examples
- Chapter-end exercises of varied kinds, including multiple choice questions
- Large number of interesting properties of complex differentiable functions
- Reveals many nice results of complex analysis
- Highlights practical applications of complex analysis in solving physical problems

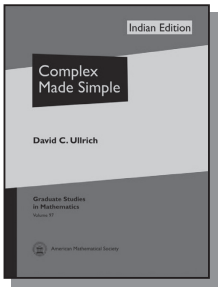
Contents: *Preface* ◆ Complex Numbers ◆ Sequence and Series ◆ Complex Differentiation ◆ Elementary Transcendental Functions ◆ Complex Integration ◆ Linear Fractional Transformations ◆ Calculus of Residues ◆ Some Relevant Theorems ◆ Entire and Meromorphic Functions ◆ Analytic Continuation | Bibliography ◆ *Index*

2018	476 pp	Paperback
978–93–86235–65–7		₹ 775.00

Complex Made Simple

AMS

David C Ullrich
Oklahoma State University, Stillwater, USA



Perhaps uniquely among mathematical topics, complex analysis presents the student with the opportunity to learn a thoroughly developed subject that is rich in both theory and applications. Even in an introductory course, the theorems and techniques can have elegant formulations. But for

any of these profound results, the student is often left asking: What does it really mean? Where does it come from?

In *Complex Made Simple,* David Ullrich shows the student how to think like an analyst. In many cases, results are discovered or derived, with an explanation of how the students might have found the theorem on their own. Ullrich explains why a proof works. He will also, sometimes, explain why a tempting idea *does not* work.

Complex Made Simple looks at the Dirichlet problem for harmonic functions twice: once using the Poisson integral for the unit disk and again in an informal section on Brownian motion, where the reader can understand intuitively how the Dirichlet problem works for general domains. Ullrich also takes considerable care to discuss the modular group, modular function, and covering maps, which become important ingredients in his modern treatment of the often-overlooked original proof of the Big Picard Theorem.

This book is suitable for a first-year course in complex analysis. The exposition is aimed directly at the students, with plenty of details included. The prerequisite is a good course in advanced calculus or undergraduate analysis.

Contents: *Part 1* ◆ Complex made simple: Differentiability and Cauchy-Riemann equations ◆ Power series ◆ Preliminary results on holomorphic functions ◆ Elementary results on holomorphic functions ◆ Logarithms, winding numbers and Cauchy's theorem ◆ Counting zeroes and the open mapping theorem ◆ Euler's formula for sin(z) ◆ Inverses of holomorphic maps ◆ Conformal mappings ◆ Normal families and the Riemann mapping theorem ◆ Harmonic functions * Simply connected open sets ◆ Runge's theorem and the Mittag-Leffler theorem ◆ The Weierstrass factorization theorem ◆ Caratheodory's theorem ◆ More on Aut(D) ◆ Analytic continuation Orientation ◆ The modular function ◆ Preliminaries for the Picard theorems ◆ The Picard theorems

Part 2: Further results: Abel's theorem ◆ More on Brownian motion ◆ More on the maximum modulus theorem ◆ The Gamma function ◆ Universal covering spaces ◆ Cauchy's theorem for non-holomorphic functions ◆ Harmonic conjugates

Part 3: Appendices ◆ Complex numbers ◆ Complex numbers, continued Sin, cos and exp ◆ Metric spaces ◆ Convexity ◆ Four counter examples ◆ The Cauchy-Riemann equations revisited ◆ *References* ◆ *Index of notations* ◆ *Index*

2012	**504 pp**	**Paperback**
978-0-8218-8722-6		**₹1,450.00**

Complex Proofs of Real Theorems

AMS

Peter D Lax
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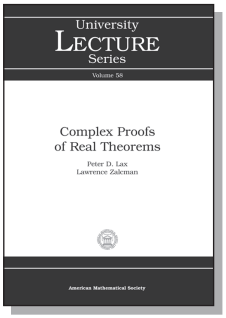
Lawrence Zalcman
Bar-Ilan University, Ramat Gan, Israel



This is an extended meditation on Hadamard's famous dictum, "The shortest and best way between two truths of the real domain often passes through the imaginary one," directed at an audience acquainted with analysis at the first year graduate level, it aims at illustrating how complex variables can be used to provide quick and efficient proofs of a wide variety of important results in such areas of analysis as approximation theory, operator theory, harmonic analysis, and complex dynamics. Topics discussed include weighted approximation on the line, Müntz's theorem, Toeplitz operators, Beurling's theorem on the invariant spaces of the shift operator, prediction theory, the Riesz convexity theorem, the Paley-Wiener theorem, the Titchmarsh convolution theorem, the Gleason-Kahane-Zelazko theorem, and the Fatou-Julia-Baker theorem. The discussion begins with the world's shortest proof of the fundamental theorem of algebra and concludes with Newman's almost effortless proof of the prime number theorem. Four brief appendices provide all necessary background in complex analysis beyond the standard first year graduate course. Lovers of analysis and beautiful proofs will read and reread this slim volume with pleasure and profit.

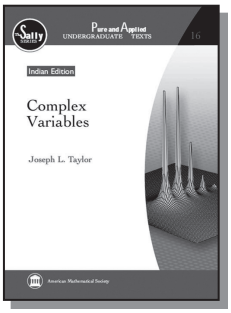
Contents: *Preface* ◆ Chapter 1. Early Triumphs ◆ The Basel Problem ◆ The Fundamental Theorem of Algebra ◆ Chapter 2. Approximation ◆ Completeness of Weighted Powers ◆ The Müntz Approximation Theorem ◆ Chapter 3. Operator Theory ◆ The Fuglede-Putnam Theorem ◆ Toeplitz Operators ◆ A Theorem of Beurling ◆ Prediction Theory ◆ The Riesz-Thorin Convexity Theorem ◆ The Hilbert Transform ◆ Chapter 4. Harmonic Analysis ◆ Fourier Uniqueness via Complex Variables (d'après D.J. Newman) ◆ A Curious Functional Equation ◆ Uniqueness and Nonuniqueness for the Radon Transform ◆ The Paley-Wiener Theorem ◆ The Titchmarsh Convolution Theorem ◆ Hardy's Theorem ◆ Chapter 5. Banach Algebras: The Gleason-Kahane-Żelazko Theorem ◆ Chapter 6. Complex Dynamics: The Fatou-Julia-Baker Theorem ◆ Chapter 7. The Prime Number Theorem Coda: Transonic Airfoils and SLE ◆ *Appendix A. Liouville's Theorem in Banach Spaces* ◆ *Appendix B. The Borel-Carathéodory Inequality* ◆ *Appendix C. Phragmén-Lindelöf Theorems* ◆ *Appendix D. Normal Families*

2016	**104 pp**	**Paperback**
978-1-4704-2600-2		**₹ 1,050.00**

Complex Variables

AMS

Joseph L Taylor
University of Utah, Salt Lake City, USA



The text covers a broad spectrum between basic and advanced complex variables on the one hand and between theoretical and applied or computational material on the other hand. With careful selection of the *emphasis put on the various sections, examples, and exercises, the book can be used in a one- or two-semester course for undergraduate mathematics majors, a one-semester course for engineering or physics majors, or a one-semester course for first-year mathematics graduate students. It has been tested in all three settings at the University of Utah.*

The exposition is clear, concise, and lively. There is a clean and modern approach to Cauchy's theorems and Taylor series expansions, with rigorous proofs but no long and tedious arguments. This is followed by the rich harvest of easy consequences of the existence of power series expansions.

Through the central portion of the text, there is a careful and extensive treatment of residue theory and its application to computation of integrals, conformal mapping and its applications to applied problems, analytic continuation, and the proofs of the Picard theorems.

Chapter 8 covers material on infinite products and zeroes of entire functions. This leads to the final chapter which is devoted to the Riemann zeta function, the Riemann Hypothesis, and a proof of the Prime Number Theorem.

Contents: *Preface* ◆ The Complex Numbers ◆ Analytic Functions ◆ Power Series Expansions ◆ The General Cauchy Theorems ◆ Residue Theory Conformal Mappings ◆ Analytic Continuation and the Picard Theorems ◆ Infinite Products ◆ The Gamma and Zeta Functions ◆ *Bibliography* ◆ *Index*

2013	**320 pp**	**Paperback**
978-1-4704-0915-9		**₹ 1,270.00**

Function Theory of One Complex Variable
(Third Edition)

AMS

Robert E Greene
University of California, Los Angeles, USA

Steven G Krantz
Washington University, St. Louis, USA

Complex analysis is one of the most central subjects in mathematics. *It is compelling and rich in its own right, but it is also remarkably useful in a wide variety of other mathematical subjects, both pure and applied. This book is different from others in that it treats complex variables as a direct development from multivariable real calculus.* As each new idea is introduced, it is related to the corresponding idea from real analysis and calculus. *The text is rich with examples and exercises that illustrate this point.* The authors have systematically separated the

analysis from the topology, as can be seen in their proof of the Cauchy theorem. The book concludes with *several chapters on special topics*, including full treatments of special functions, the prime number theorem, and the Bergman kernel. The authors also treat H^p spaces and Painlevé's theorem on smoothness to the boundary for conformal maps. *This book is a text for a first-year graduate course in complex analysis.* It is an engaging and modern introduction to the subject, reflecting the authors' expertise both as mathematicians and as expositors.

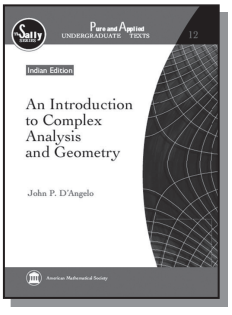
Contents: Fundamental Concepts ◆ Complex Line Integrals ◆ Applications of the Cauchy Integral ◆ Meromorphic Functions and Residues ◆ The Zeros of a Holomorphic Function ◆ Holomorphic Functions as Geometric Mappings ◆ Harmonic Functions ◆ Infinite Series and Products ◆ Applications of Infinite Sums and Products ◆ Analytic Continuation ◆ Topology ◆ Rational Approximation Theory ◆ Special Classes of Holomorphic Functions ◆ Hilbert Spaces of Holomorphic Functions, the Bergman Kernel, and Biholomorphic Mappings ◆ Special Functions ◆ The Prime Number Theorem ◆ *Appendix A: Real Analysis* ◆ *Appendix B: The Statement and Proof of Goursat's Theorem* ◆ *References* ◆ *Index*

2011	528 pp	Paperback
978-0-8218-6877-5		₹ 1,885.00

Introduction to Complex Analysis and Geometry, An

AMS

John P D'Angelo
University of Illinois at Urbana-Champaign, USA



An Introduction to Complex Analysis and Geometry *provides the reader with a deep appreciation of complex analysis and how this subject fits into mathematics.* The book developed from courses given in the Campus Honors Program at the University of Illinois Urbana-Champaign. These courses aimed to share with students the way many mathematics and physics problems magically simplify when viewed from the perspective of complex analysis. The book begins at an elementary level but also contains advanced material.

The *first four chapters* provide an introduction to complex analysis with many elementary and unusual applications. *Chapters 5 through 7* develop the Cauchy theory and include some striking applications to calculus. *Chapter 8* glimpses several appealing topics, simultaneously unifying the book and opening the door to further study.

The *280 exercises* range from simple computations to difficult problems. Their variety makes the book especially attractive.

A reader of the first four chapters will be able to apply complex numbers in many elementary contexts. *A reader of the full book will know basic one complex variable theory and will have seen it integrated into mathematics as a whole.* Research mathematicians will discover several novel perspectives.

Contents: *Preface* ◆ From the Real Numbers to the Complex Numbers ◆ Introduction Number systems Inequalities and ordered elds ◆ The complex numbers ◆ Alternative denitions of C ◆ A glimpse at metric spacesComplex Numbers ◆ Complex conjugation ◆ Existence of square roots ◆ Limits ◆ Convergent infinite series ◆ Uniform convergence and consequences ◆ The unit circle and trigonometry ◆ The geometry of addition and multiplication ◆ Logarithms ◆ Complex Numbers and Geometry ◆ Lines, circles, and balls ◆ Analytic geometry ◆ Quadratic polynomials ◆ Linear fractional transformations ◆ The Riemann sphere ◆ Power Series Expansions ◆ Geometric series ◆ The radius of convergence ◆ Generating functions ◆ Fibonacci numbers ◆ An application of power series RationalityComplex Differentiation ◆ Definitions of complex analytic function ◆ Complex differentiation ◆ The Cauchy-Riemann equations ◆ Orthogonal trajectories and harmonic functions ◆ A glimpse at harmonic functions ◆ What is a differential form? ◆ Complex Integration ◆ Complex-valued functions Line integrals ◆ Goursat's proof ◆ The Cauchy integral formula ◆ A return to the definition of complex analytic function ◆ Applications of

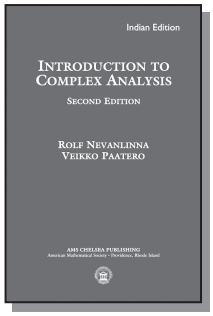
Complex Integration ◆ Singularities and residues ◆ Evaluating real integrals using complex variables methods ◆ Fourier transforms ◆ The Gamma function ◆ Additional Topics ◆ The minimum-maximum theorem ◆ The fundamental theorem of algebra ◆ Winding numbers, zeroes, and poles ◆ Pythagorean triples ◆ Elementary mappings ◆ Quaternions Higher-dimensional complex analysis ◆ *Further reading* ◆ *Bibliography* ◆ *Index*

2013	176 pp	Paperback
978-1-4704-0912-8		₹ 1,320.00

Introduction to Complex Analysis (Second Edition)

AMS

Rolf Nevanlinna & Veikko Paatero



It really is a gem, both in terms of its table of contents and the level of discussion. The exercises also look very good. —*Clifford Earle, Cornell University*

This book has a soul and has passion. —*William Abikoff, University of Connecticut.*

This classic book gives an excellent presentation of topics usually treated in a complex analysis course, starting with basic notions (rational functions, linear transformations, analytic function), and culminating in the discussion of conformal mappings, including the Riemann mapping theorem and the Picard theorem.

The two quotes above confirm that the book can be successfully used as a text for a class or for self-study.

Contents: The Concept of an Analytic Function ◆ The complex numbers ◆ Point sets in the complex plane ◆ Functions of a complex variable ◆ General Properties of Rational Functions ◆ The n-th power ◆ Polynomials ◆ Rational functions ◆ Linear Transformations ◆ Basic properties of linear transformations ◆ Mapping problems ◆ Stereographic projection ◆ Mapping by Rational Functions of Second Order ◆ The Exponential Function and its Inverse. The General Power ◆ Definition and basic properties of the exponential function ◆ Mapping by means of the exponential function. The logarithm ◆ The general power ◆ The Trigonometric Functions ◆ The sine and cosine ◆ The tangent and the cotangent ◆ The mappings given by the functions tan z and cot z ◆ Their inverse functions ◆ The mappings given by the functions sin z and cos z ◆ The functions arc sin z & arc cos z ◆ Survey of the Riemann surfaces of the elementary functions ◆ Infinite Series with Complex Terms ◆ General theorems ◆ Power series ◆ Integration in the Complex Domain. Cauchy's Theorem ◆ Complex line integrals ◆ The primitive function ◆ Cauchy's theorem ◆ The general formulation of Cauchy's theorem ◆ Cauchy's Integral Formula and its Applications ◆ Cauchy's formula ◆ The Taylor expansion of an analytic function ◆ Consequences of Cauchy's integral formula ◆ The Laurent expansion Isolated singularities of an analytic function ◆ The inverse of an analytic function Mapping by a rational function ◆ Normal Families ◆ The Residue Theorem and its Applications ◆ The residue theorem ◆ Application of the residue theorem to the evaluation of definite integrals ◆ The partial-fraction expansion of cot ttz ◆ The argument principle ◆ Applications of the argument principle ◆ Harmonic Functions ◆ Preliminary considerations Gauss's mean-value theorem. The maximum and minimum principles ◆ Poisson's formula ◆ The harmonic measure ◆ The Dirichlet problem ◆ Harnack's principle ◆ Analytic Continuation ◆ The principle of analytic continuation The monodromy theorem ◆ The inverse of a rational function ◆ Harmonic continuation. The reflection principle ◆Entire Functions ◆ Infinite products ◆ Product representation of the function w sin nz ◆ The Weierstrass factorization theorem Jensen's formula. The growth of entire functions ◆ Periodic Functions ◆ Definitions of simply and doubly periodic functions ◆ Reduction of simply periodic functions to the exponential function ◆ The basic properties of doubly periodic functions ◆ The Weierstrass $\wp$-function ◆ The Weierstrass ζ- and cr-functions Representation of doubly periodic functions by means of the σ-function ◆ The differential equation of the function $\wp(z)$ ◆ Representation of doubly periodic functions asrational functions of $\wp$ and $\wp'$ ◆ Addition theorem for doubly periodic functions ◆ Determination of a doubly periodic function with prescribed principal

parts ◆ Mapping by a doubly periodic function of order 2 ◆ Elliptic integrals ◆ The Euler Γ-Function ◆ Definition of the Γ-function ◆ Stirling's formula ◆ The product representation of the r-function ◆ The Riemann ζ-Function ◆ Definition and the Euler product formula ◆ Integral representation of the ζ-function ◆ Analytic continuation of the ζ-function ◆ Riemann's functional equation ◆ The zeros of the ζ-function and the distribution of prime numbers ◆ The Theory of Conformal Mapping ◆ The Riemann mapping theorem ◆ Construction of the solution Boundary correspondence under conformal mapping ◆ The connection between conformal mapping and the Dirichlet problem ◆ The conformal mapping of polygons Triangle functions ◆ The Picard theorem ◆ *Index*

2012	360 pp	Paperback
978–0–8218–9179–7		₹ 1,770.00

Computational Mathematics

Computability Theory

AMS

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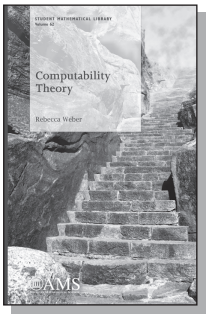

What can we compute--even with unlimited resources? Is everything within reach? Or are computations necessarily drastically limited, not just in practice, but theoretically? These questions are at the heart of computability theory. The goal of this book is to give the reader a firm grounding in the fundamentals of computability theory and an overview of currently active areas of research, such as reverse mathematics and algorithmic randomness. Turing machines and partial recursive functions are explored in detail, and vital tools and concepts including coding, uniformity, and diagonalization are described explicitly. From there the material continues with universal machines, the halting problem, parametrization and the recursion theorem, and thence to computability for sets, enumerability, and turing reduction and degrees. A few more advanced topics round out the book before the chapter on areas of research. The text is designed to be self-contained, with an entire chapter of preliminary material including relations, recursion, induction, and logical and set notation and operators. That background, along with ample explanation, examples, exercises, and suggestions for further reading, make this book ideal for independent study or courses with few prerequisites.

Contents: Chapter 1. Introduction ◆ Approach ◆ Some History ◆ Notes on Use of the Text ◆ Acknowledgements and References ◆ Chapter ◆ Background ◆ First-Order Logic ◆ Sets ◆ Relations ◆ Bijection and Isomorphism ◆ Recursion and Induction ◆ Some Notes on Proofs and Abstraction ◆ Chapter 3. Defining Computability ◆ Functions, Sets, and Sequences ◆ Turing Machines ◆ Partial Recursive Functions ◆ Coding and Countability ◆ A Universal Turing Machine ◆ The Church-Turing Thesis ◆ Other Definitions of Computability ◆ Chapter 4. Working with Computable Functions ◆ The Halting Problem ◆ The "Three Contradictions" ◆ Parametrization ◆ The Recursion Theorem ◆ Unsolvability ◆ Chapter 5. Computing and Enumerating Sets ◆ Dovetailing ◆ Computing and Enumerating ◆ Aside: Enumeration and Incompleteness ◆ Enumerating Noncomputable Sets ◆ Chapter 6. Turing Reduction and Post's Problem ◆ Reducibility of Sets ◆ Finite Injury Priority Arguments ◆ Notes on Approximation ◆ Chapter 7. Two Hierarchies of Sets ◆ Turing Degrees and Relativization ◆ The Arithmetical Hierarchy ◆ Index Sets and Arithmetical Completeness ◆ Chapter 8. Further Tools and Results ◆ The Limit Lemma ◆ The Arslanov Completeness Criterion ◆ E Modulo Finite Difference ◆ Chapter 9. Areas of Research ◆ Computably Enumerable Sets and Degrees ◆ Randomness ◆ Some Model Theory ◆ Computable Model Theory ◆ Reverse Mathematics ◆ *Appendix A. Mathematical Asides* ◆ *A.1. The Greek Alphabet* ◆ *A.2. Summations* ◆ *A.3. Cantor's Cardinality Proofs* ◆ *Bibliography* ◆ *Index*

2016	208 pp	Paperback
978–1–4704–2594–4		₹ 1,250.00

Geometric Approximation Algorithms AMS

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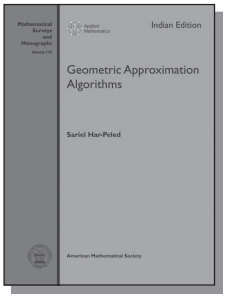


Exact algorithms for dealing with geometric objects are complicated, hard to implement in practice, and slow. Over the last 20 years, a theory of geometric approximation algorithms has emerged. These algorithms tend to be simple, fast, and more robust than their exact counterparts.

This book is the first to cover geometric approximation algorithms in detail. In addition, more traditional computational geometry techniques that are widely used in developing such algorithms, like sampling, linear programming, etc., are also surveyed. Other topics covered include approximate nearest-neighbor search, shape approximation, coresets, dimension reduction, and embeddings. The topics covered are relatively independent and are supplemented by exercises. Close to 200 color figures are included in the text to illustrate proofs and ideas.

Contents: *Preface* ◆ Chapter 1. The Power of Grids – Closest Pair and Smallest Enclosing Disk ◆ Preliminaries ◆ Closest pair ◆ A slow 2-approximation algorithm for the k-enclosing disk ◆ A linear time 2-approximation for the k-enclosing disk ◆ Bibliographical notes ◆ Exercises ◆ Chapter 2. Quadtrees – Hierarchical Grids ◆ Quadtrees – a simple point-location data-structure ◆ Compressed quadtrees ◆ Dynamic quadtrees ◆ Bibliographical notes ◆ Exercises ◆ Chapter 3. Well-Separated Pair Decomposition ◆ Well-separated pair decomposition (WSPD) ◆ Applications of WSPD ◆ Semi-separated pair decomposition (SSPD) ◆ Bibliographical notes ◆ Exercises ◆ Chapter 4. Clustering – Definitions and Basic Algorithms ◆ Preliminaries ◆ On k-center clustering ◆ On k-median clustering ◆ On k-means clustering ◆ Bibliographical notes ◆ Exercises ◆ Chapter 5. On Complexity, Sampling, and e-Nets and e-Samples ◆ VC dimension ◆ Shattering dimension and the dual shattering dimension ◆ On e-nets and e-sampling ◆ Discrepancy ◆ Proof of the e-net theorem ◆ A better bound on the growth function ◆ Bibliographical notes ◆ Exercises ◆ Chapter 6. Approximation via Reweighting ◆ Preliminaries ◆ Computing a spanning tree with low crossing number ◆ Geometric set cover ◆ Geometric set cover via linear programming ◆ Bibliographical notes ◆ Exercises ◆ Chapter 7. Yet Even More on Sampling ◆ Introduction ◆ Applications ◆ Proof of Theorem 7.7 ◆ Bibliographical notes ◆ Exercises ◆ Chapter 8. Sampling and the Moments Technique ◆ Vertical decomposition ◆ General settings ◆ Applications ◆ Bounds on the probability of a region to be created ◆ Bibliographical notes ◆ Exercises ◆ Chapter 9. Depth Estimation via Sampling ◆ The at most k-levels ◆ The crossing lemma ◆ A general bound for the at most k-weight ◆ Bibliographical notes ◆ Exercises ◆ Chapter 10. Approximating the Depth via Sampling and Emptiness ◆ From emptiness to approximate range counting ◆ Application: Halfplane and halfspace range counting ◆ Relative approximation via sampling ◆ Bibliographical notes ◆ Exercises ◆ Chapter 11. Random Partition via Shifting ◆ Partition via shifting ◆ Hierarchical representation of a point set ◆ Low quality ANN search ◆ Bibliographical notes ◆ Exercises ◆ Chapter 12. Good Triangulations and Meshing ◆ Introduction – good triangulations ◆ Triangulations and fat triangulations ◆ Analysis ◆ The result ◆ Bibliographical notes ◆ Chapter 13. Approximating the Euclidean Traveling Salesman Problem (TSP) ◆ The TSP problem – introduction ◆ When the optimal solution is friendly ◆ TSP approximation via portals and sliding quadtrees ◆ Bibliographical notes ◆ Exercises ◆ Chapter 14. Approximating the Euclidean TSP Using Bridges ◆ Overview ◆ Cuts and bridges ◆ The dynamic programming ◆ The result ◆ Bibliographical notes ◆ Chapter 15. Linear Programming in Low Dimensions ◆ Linear programming ◆ Low-dimensional linear programming ◆ Linear programming with violations ◆ Approximate linear programming with violations ◆ LP-type problems ◆ Bibliographical notes ◆ Exercises ◆ Chapter 16. Polyhedrons, Polytopes, and Linear Programming ◆ Preliminaries ◆ Properties of polyhedrons ◆ Vertices of a polytope ◆ Linear programming correctness ◆ Bibliographical notes ◆ Exercises ◆ Chapter 17. Approximate Nearest Neighbor Search in Low Dimension ◆ Introduction ◆ The bounded spread case ◆ ANN – the unbounded

general case ◆ Low quality ANN search via the ring separator tree ◆ Bibliographical notes ◆ Exercises ◆ Chapter 18. Approximate Nearest Neighbor via Point-Location ◆ ANN using point-location among balls ◆ ANN using point-location among approximate balls ◆ ANN using point-location among balls in low dimensions ◆ Approximate Voronoi diagrams ◆ Bibliographical notes ◆ Exercises ◆ Chapter 19. Dimension Reduction – The Johnson-Lindenstrauss (JL) Lemma ◆ The Brunn-Minkowski inequality ◆ Measure concentration on the sphere ◆ Concentration of Lipschitz functions ◆ The Johnson-Lindenstrauss lemma ◆ Bibliographical notes ◆ Exercises ◆ Chapter 20. Approximate Nearest Neighbor (ANN) Search in High Dimensions ◆ ANN on the hypercube ◆ LSH and ANN in Euclidean space ◆ Bibliographical notes ◆ Chapter 21. Approximating a Convex Body by an Ellipsoid ◆ Ellipsoids ◆ Bibliographical notes ◆ Chapter 22. Approximating the Minimum Volume Bounding Box of a Point Set ◆ Some geometry ◆ Approximating the minimum volume bounding box ◆ Exact algorithm for the minimum volume bounding box ◆ Approximating the minimum volume bounding box in three dimensions ◆ Bibliographical notes ◆ Exercises ◆ Chapter 23. Coresets ◆ Coreset for directional width ◆ Approximating the extent of lines and other creatures ◆ Extent of polynomials ◆ Roots of polynomials ◆ Bibliographical notes ◆ Exercises ◆ Chapter 24. Approximation Using Shell Sets ◆ Covering problems, expansion, and shell sets ◆ Covering by cylinders ◆ Bibliographical notes ◆ Exercises ◆ Chapter 25. Duality ◆ Duality of lines and points ◆ Higher dimensions ◆ Bibliographical notes ◆ Exercises ◆ Chapter 26. Finite Metric Spaces and Partitions ◆ Finite metric spaces ◆ Random partitions ◆ Probabilistic embedding into trees ◆ Embedding any metric space into Euclidean space ◆ Bibliographical notes ◆ Exercises ◆ Chapter 27. Some Probability and Tail Inequalities ◆ Some probability background ◆ Tail inequalities ◆ Hoeffding's inequality ◆ Bibliographical notes ◆ Exercises ◆ Chapter 28. Miscellaneous Prerequisite ◆ Geometry and linear algebra ◆ Calculus ◆ *Bibliography* ◆ *Index*

2013	376 pp	Paperback
978-1-4704-0930-2		₹ 1,600.00

Introduction to Mathematical Computer Science, An

Kasturi Viswanath
University of Hyderabad, India

Series: Systems, Models, Informatics and Control (SMIC)

An Introduction to Mathematical Computer Science explores an alternative approach to the teaching of computer science, an approach that is independent of technology, using a methodology that simultaneously deals with both theory and practice.

The 'mapcode' formalism introduced here is based on classical ideas, but this book is the first to explore the possibilities of the formalism extensively to evolve the subject as an area of mathematics. Using only the algebra of sets and maps and no advanced mathematics or formal logic, the book suggests a unified point of view for understanding the structure of finite automata, Turing machines, von Neumann machines, and neural systems. It also introduces a 10-step design process for devising algorithms and verifying their termination and correctness. Recursion and sorting algorithms are examined. Data types and Boolean function theory are explained from a novel point of view.

The book, with its several illustrative diagrams and exercises, will serve as a textbook for mathematics and computer science students at both undergraduate and graduate levels.

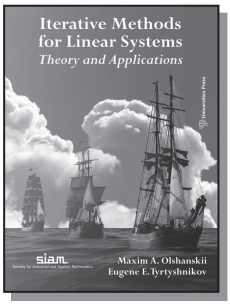
Contents: *Foreword* ◆ *Preface* ◆ Motivation and Notation ◆ Discrete Flows ◆ Mapcode Machines ◆ Finite Automata ◆ Turing Machines ◆ What is Programming? ◆ Mapcode Theorems ◆ Recursion ◆ Sorting Algorithms ◆ Data Types ◆ Boolean Spaces and Maps ◆ What is a Computer? ◆ Topological Computations ◆ Neural Systems ◆ *Appendix A: Number Representations* ◆ *Appendix B: Arithmetic with Limited Storage* ◆ *Bibliography* ◆ *Index*

2008	304 pp	Paperback
978-81-7371-630-0		₹ 975.00

Iterative Methods for Linear Systems: Theory and Applications

AMS

Maxim A Olshanskii
University of Houston, Houston, TX



Iterative Methods for Linear Systems offers a mathematically rigorous introduction to fundamental iterative methods for systems of linear algebraic equations. The book distinguishes itself from other texts on the topic by providing a straightforward yet comprehensive analysis of the Krylov subspace methods, approaching the development and analysis of algorithms from various algorithmic and mathematical perspectives, and going beyond the standard description of iterative methods by connecting them in a natural way to the idea of preconditioning.

2017	264 pp	Paperback
978-93-86235-36-7		₹ 900.00

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India

Amber Habib
Shiv Nadar Institution of Eminence, Delhi NCR, India

Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India

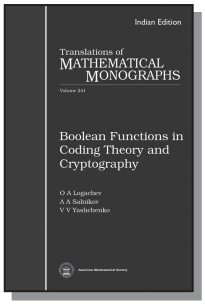
See page 69

Cryptography

Boolean Functions in Coding Theory and Cryptography

AMS

Logachev O A, Salnikov A A, Yashchenko V V
Moscow State University, Moscow, Russia



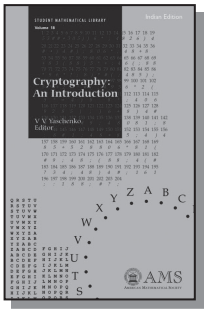
This book offers a systematic presentation of cryptographic and code-theoretic aspects of the theory of Boolean functions. Both classical and recent results are thoroughly presented. Prerequisites for the book include basic knowledge of linear algebra, group theory, theory of finite fields, combinatorics and probability. The book can be used by research mathematicians and graduate students interested in discrete mathematics, coding theory and cryptography.

2017	352 pp	Paperback
978-1-4704-3737-4		₹ 1,770.00

Cryptography: An Introduction

AMS

V V Yaschenko
Moscow Center for Continuous Mathematics Education, Russia



Learning about cryptography requires examining fundamental issues about information security. Questions abound, ranging from "From whom

are we protecting ourselves?" and "How can we measure levels of security?" to "What are our opponent's capabilities?" and "What are their goals?" Answering these questions requires and understanding of basic cryptography. This book, written by Russian cryptographers, explains those basics.

Chapters are independent and can be read in any order. The introduction gives a general description of all the main notions of modern cryptography: a cipher, a key, security, and electronic digital signature, a cryptographic protocol, etc. Other chapters delve more deeply into this material. The final chapter presents problems and selected solutions from *Cryptography Olympiads for (Russian) High School Students*.

This is an English translation of a Russian textbook. It is suitable for advanced high school students and undergraduates studying information security. It is also appropriate for a general mathematical audience interested in cryptography.

Contents: Main notions ◆ Cryptograpy and complexity theory ◆ Cryptographic protocols ◆ Algorithmic problems of number theory ◆ Mathematics of secret sharing ◆ Cryptography olympiads for high school students ◆ *Bibliography*

2009	**240 pp**	**Paperback**
978-0-8218-4850-0		**₹ 1,075.00**

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India

Amber Habib
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Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India

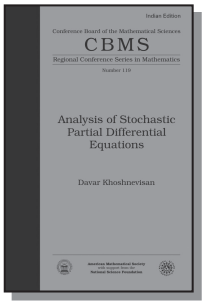
See page 69

Differential Equations

Analysis of Stochastic Partial Differential Equations

AMS

Davar Khoshnevisan
University of Utah, Salt Lake City, UT



The general area of stochastic PDEs is interesting to mathematicians because it contains an enormous number of challenging open problems. There is also a great deal of interest in this topic because it has deep applications in disciplines that range from applied mathematics, statistical mechanics and theoretical physics, to theoretical neuroscience, theory of complex chemical reactions (including polymer science), fluid dynamics and mathematical finance.

The stochastic PDEs that are studied in this book are similar to the familiar PDE for heat in a thin rod, but with the additional restriction that the external forcing density is a two-parameter stochastic process, or what is more commonly the case, the forcing is a 'random noise', also known as a 'generalized random field'. At several points in the lectures, there are examples that highlight the phenomenon that stochastic PDEs are not a subset of PDEs. In fact, the introduction of noise in some partial differential equations can bring about not a small perturbation, but truly fundamental changes to the system that the underlying PDE is attempting to describe.

The topics covered include a brief introduction to the stochastic heat equation, structure theory for the linear stochastic heat equation, and an in-depth look at intermittency properties of the solution to semilinear stochastic heat equations. Specific topics include stochastic integrals à la Norbert Wiener, an infinite-dimensional Itô-type

stochastic integral, an example of a parabolic Anderson model, and intermittency fronts.

There are many possible approaches to stochastic PDEs. The selection of topics and techniques presented here are informed by the guiding example of the stochastic heat equation.

2017	128 pp	Paperback
978–1–4704–3725–1		₹ 1,185.00

Basic Course in Partial Differential Equations, A

AMS

Qing Han
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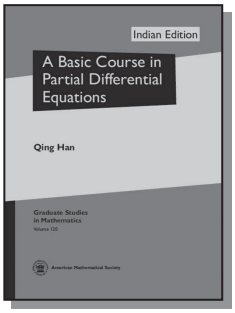


This is a textbook for an introductory graduate course on partial differential equations. Han focuses on linear equations of first and second order. An important feature of his treatment is that the majority of the techniques are applicable more generally. In particular, Han emphasizes a priori estimates throughout the text, even for those equations that can be solved explicitly. Such estimates are indispensable tools for proving the existence and uniqueness of solutions to PDEs, being especially important for nonlinear equations. The estimates are also crucial to establishing properties of the solutions, such as the continuous dependence on parameters.

Han's book is suitable for students interested in the mathematical theory of partial differential equations, either as an overview of the subject or as an introduction leading to further study.

Contents: *Preface* ◆ Introduction ◆ Notation ◆ Overview ◆ First-Order Differential Equations ◆ Noncharacteristic Hypersurfaces ◆ The Method of Characteristics ◆ A Priori Estimates ◆ *Exercises* ◆ An Overview of Second-Order PDEs ◆ Classifications ◆ Energy Estimates ◆ Separation of Variables ◆ Exercises ◆ Laplace Equations ◆ Fundamental Solutions ◆ Mean-Value Properties ◆ The Maximum Principle ◆ Poisson Equations ◆ *Exercises* ◆ Heat Equations ◆ Fourier Transforms ◆ Fundamental Solutions ◆ The Maximum Principle ◆ *Exercises* ◆ Wave Equations ◆ One-Dimensional Wave Equations ◆ Higher-Dimensional Wave Equations ◆ Energy Estimates ◆ *Exercises* ◆ First-Order Differential Systems ◆ Noncharacteristic Hypersurfaces ◆ Analytic Solutions ◆ Nonexistence of Smooth Solutions ◆ *Exercises* ◆ *Epilogue* ◆ *Basic Linear Differential Equations* ◆ *Examples of Nonlinear Differential Equations* ◆ *Bibliography* ◆ *Index*

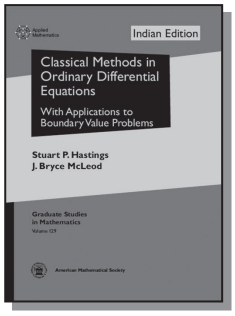
2013	304 pp	Paperback
978–1–4704–0921–0		₹ 1,525.00

Classical Methods in Ordinary Differential Equations: With Applications to Boundary Value Problems

AMS

Stuart P Hastings
University of Pittsburgh, USA

J Bryce McLeod
Oxford University, UK; University of Pittsburgh, USA



This text emphasizes rigorous mathematical techniques for the analysis of boundary value problems for ODEs arising in applications. The emphasis is on proving existence of solutions, but there is also a substantial chapter on uniqueness and multiplicity questions and several chapters which deal with the asymptotic behavior of solutions with respect to either the independent variable or some parameter. These equations may give special solutions of important PDEs, such as steady state or traveling wave solutions. Often two, or even three, approaches to the same problem are described. The advantages and disadvantages of different methods are discussed.

The book gives complete classical proofs, while also emphasizing the importance of modern methods, especially when extensions to infinite dimensional settings are needed. There are some new results as well as new and improved proofs of known theorems. The final chapter presents three unsolved problems which have received much attention over the years.

Both graduate students and more experienced researchers will be interested in the power of classical methods for problems which have also been studied with more abstract techniques. The presentation should be more accessible to mathematically inclined researchers from other areas of science and engineering than most graduate texts in mathematics.

Contents: *Preface* ◆ *Introduction* ◆ An introduction to shooting methods ◆ Heteroclinic orbits and the FitzHugh-Nagumo equations ◆ Shooting when there are oscillations: A third order problem ◆ Boundedness on (−∞,∞) and two-parameter shooting ◆ Ważewski's principle, Conley index, and an n-dimensional lemma ◆ Some boundary value problems for the Painlev´e transcendents ◆ Periodic solutions of a higher order system ◆ A global approach via the Brouwer fixed point theorem ◆ A linear example ◆ Homoclinic orbits of the FitzHugh-Nagumo equations ◆ Existence of homoclinic orbits using geometric perturbation theory ◆ Existence of homoclinic orbits by shooting ◆ Singular perturbation problems—rigorous matching ◆ Introduction to the method of matched asymptotic expansions ◆ Asymptotics beyond all orders ◆ Some solutions of the Falkner–Skan equation ◆ Poiseuille flow: Perturbation and decay ◆ Bending of a tapered rod; variational methods and shooting ◆ A calculus of variations approach in Hilbert space ◆ Uniqueness and multiplicity ◆ Shooting with more parameters ◆ Some problems of A C Lazer ◆ Chaotic motion of a pendulum ◆ Layers and spikes in reaction-diffusion equations, I ◆ Uniform expansions for a class of second order problems ◆ Layers and spikes in reaction-diffusion equations, II ◆ Three unsolved problems ◆ Homoclinic orbit for the equation of a suspension bridge

2013	**392 pp**	**Paperback**
978–1–4704–0924–1		**₹ 1,600.00**

Differential Equations, Mechanics, and Computation

AMS

Richard S Palais
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Robert A Palais
University of Utah, Salt Lake City, USA

This book provides a conceptual introduction to the theory of ordinary differential equations, concentrating on the initial value problem for equations of evolution and with applications to the calculus of variations and classical mechanics, along with a discussion of chaos theory and ecological models. It has a unified and visual introduction to the theory of numerical methods and a novel approach to the analysis of errors and stability of various numerical solution algorithms based on carefully chosen model problems. *While the book would be suitable as a textbook for an undergraduate or elementary graduate course in ordinary differential equations, the authors have designed the text also to be useful for motivated students wishing to learn the material on their own or desiring to supplement an ODE textbook being used in a course they are taking with a text offering a more conceptual approach to the subject.*

Contents: Introduction ◆ Differential equations and their solutions ◆ Linear differential equations ◆ Second-order ODE and the calculus of variations ◆ Newtonian mechanics ◆ Numerical methods ◆ Linear algebra and analysis ◆ The magic of iteration Vector fields as differential operators ◆ Coordinate systems and canonical forms ◆ Parametrized curves and arclength ◆ Smoothness with respect to initial conditions ◆ Canonical form for linear operators ◆ Runge-Kutta Methods ◆ Multistep methods ◆ Iterative interpolation and its error ◆ *Bibliography* ◆ *Index*

2012	**328 pp**	**Paperback**
978–0–8218–8735–6		**₹ 1,525.00**

Elliptic Partial Differential Equations

AMS

Qing Han
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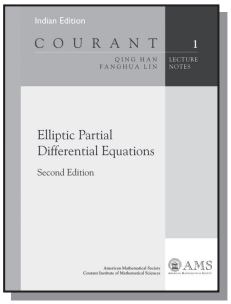
Fanghua Lin
Courant Institute, New York University, New York, NY



This volume is based on PDE courses given by the authors at the Courant Institute and at the University of Notre Dame, Indiana. Presented are basic methods for obtaining various a priori estimates for second order equations of elliptic type with particular emphasis on maximal principles, Harnack inequalities, and their applications. The equations considered in the book are linear; however, the presented methods also apply to nonlinear problems.

This second edition has been thoroughly revised and in a new chapter the authors discuss several methods for proving the existence of solutions of primarily the Dirichlet problem for various types of elliptic equations.

2017	**160 pp**	**Paperback**
978-1-4704-3742-8		**₹ 1,255.00**

Geometry of Differential Forms

AMS

Shigeyuli Morita
University of Tokyo, Japan

Since the times of Gauss, Riemann, and Poincare, one of the principal goals of the study of manifolds has been to relate local analytic properties of a manifold with its global topological properties. Among the high points on this route are the Gauss – Bonnet formula, the de Rham complex, and the Hodge theorem: these results show, in particular, that the central tool in reaching the main goal of global analysis is the theory of differential forms. *This book is a comprehensive introduction to differential forms.* It begins with a quick presentation of the notion of differentiable manifolds and then develops basic properties of differential forms as well as fundamental results about them, such as the de Rham and Frobenius theorems. The second half of the book is devoted to more advanced material, including Laplacians and harmonic forms on manifolds, the concepts of vector bundles and fibre bundles and the theory of characteristic classes. Among the less traditional topics treated in the book is a detailed description of the Chern – Weil theory. *With the minimal prerequisites, the book can serve as a textbook for an advanced undergraduate or a graduate course in differential geometry.*

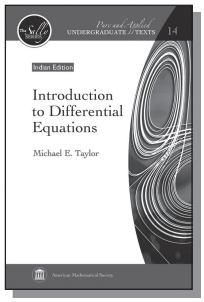
Contents: Manifolds ⋄ Differential forms ⋄ de Rham theorem ⋄ Laplacian and harmonic forms ⋄ Vector bundles and characteristic classes ⋄ Fiber bundles and characteristic classes ⋄ *Perspectives* ⋄ *Solutions* ⋄ *References* ⋄ *Index*

2009	**352 pp**	**Paperback**
978-0-8218-4852-4		**₹ 1,770.00**

Introduction to Differential Equations

AMS

Michael E Taylor
University of North Carolina, Chapel Hill, USA



The mathematical formulations of problems in physics, economics, biology, and other sciences are usually embodied in differential equations. The analysis of the resulting equations then provides new insight into the original problems. This book describes the tools for performing that analysis.

The first chapter treats single differential equations, emphasizing linear and nonlinear first order equations, linear second order equations, and a class of nonlinear second order equations arising from Newton's laws. The first order linear theory starts with a self-contained presentation of the exponential and trigonometric functions, which plays a central role in the subsequent development of this chapter. Chapter 2 provides a mini-course on linear algebra, giving detailed treatments of linear transformations, determinants and invertibility, eigenvalues and eigenvectors, and

generalized eigenvectors. This treatment is more detailed than that in most differential equations texts, and provides a solid foundation for the next two chapters. Chapter 3 studies linear systems of differential equations. It starts with the matrix exponential, melding material from Chapters 1 and 2, and uses this exponential as a key tool in the linear theory. Chapter 4 deals with nonlinear systems of differential equations. This uses all the material developed in the first three chapters and moves it to a deeper level. The chapter includes theoretical studies, such as the fundamental existence and uniqueness theorem, but also has numerous examples, arising from Newtonian physics, mathematical biology, electrical circuits, and geometrical problems. These studies bring in variational methods, a fertile source of nonlinear systems of differential equations.

The reader who works through this book will be well prepared for advanced studies in dynamical systems, mathematical physics, and partial differential equations.

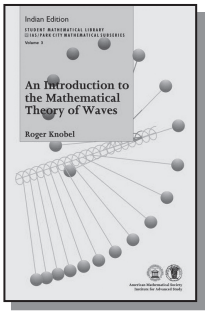
Contents: *Preface* ◆ Single Differential Equations ◆ Linear Algebra ◆ Linear Systems of Differential Equations ◆ Nonlinear Systems of Differential Equations ◆ *Bibliography* ◆ *Index*

2013	**424 pp**	**Paperback**
978–1–4704–0913–5		**₹ 1,670.00**

Introduction to the Mathematical Theory of Waves, An

AMS

Roger Knobel
University of Texas–Pan American, Edinburg, USA



This book is based on an undergraduate course taught at the IAS/Park City Mathematics Institute (Utah) on linear and nonlinear waves. *The first part of the text* overviews the concept of a wave, describes one-dimensional waves using functions of two variables, provides an introduction to partial differential equations, and discusses computer-aided visualization techniques.

The second part of the book discusses traveling waves, leading to a description of solitary waves and soliton solutions of the Klein–Gordon and Korteweg–deVries equations. The wave equation is derived to model the small vibrations of a taut string, and solutions are constructed via d'Alembert's formula and Fourier series.

The last part of the book discusses waves arising from conservation laws. After deriving and discussing the scalar conservation law, its solution is described using the method of characteristics, leading to the formation of shock and rarefaction waves. Applications of these concepts are then given for models of traffic flow.

The intent of this book is to create a text suitable for independent study by undergraduate students in mathematics, engineering, and science. The content of the book is meant to be self-contained, requiring no special reference material. Access to computer software such as Mathematica®, MATLAB®, or Maple® is recommended, but not necessary. *Scripts for MATLAB applications will be available via the Web. Exercises are given within the text to allow further practice with selected topics.*

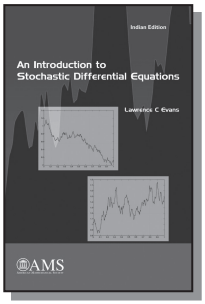
Contents: Introduction ◆ Introduction to waves ◆ A mathematical representation of waves ◆ Partial differential equation Traveling and standing waves ◆ Traveling waves ◆ The Korteweg-de Vries equation ◆ The Sine-Gordon equation ◆ The wave equation ◆ D'Alembert's solution of the wave equation ◆ Vibrations of a semi-infinite string ◆ Characteristic lines of the wave equation ◆ Standing wave solutions of the wave equation ◆ Standing waves of a nonhomogeneous string ◆ Superposition of standing waves ◆ Fourier series and the wave equation ◆ Waves in conservation laws ◆ Conservation laws ◆ Examples of conservation laws ◆ The method of characteristics ◆ Gradient catastrophes and breaking times ◆ Shock waves ◆ Shock wave example: Traffic at a red light ◆ Shock waves and the viscosity method ◆ Rarefaction waves ◆ An example with rarefaction and shock waves ◆ Nonunique solutions and the entropy condition ◆ Weak solutions of conservation laws ◆ *Bibliography* ◆ *Index*

2012	**212 pp**	**Paperback**
978–0–8218–8729–5		**₹ 1,320.00**

Introduction to Stochastic Differential Equations, An

AMS

Lawrence C Evans
University of California, Berkeley, Berkeley, CA



This short book provides a quick, but very readable introduction to stochastic differential equations, that is, to differential equations subject to additive 'white noise' and related random disturbances. The exposition is concise and strongly focused upon the interplay between probabilistic intuition and mathematical rigor. Topics include a quick survey of measure theoretic probability theory, followed by an introduction to Brownian motion and the Itô stochastic calculus, and finally the theory of stochastic differential equations. The text also includes applications to partial differential equations, optimal stopping problems and options pricing.

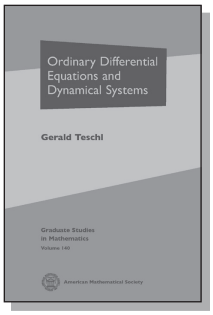
This book can be used as a text for senior undergraduates or beginning graduate students in mathematics, applied mathematics, physics and financial mathematics, who want to learn the basics of stochastic differential equations. The reader is assumed to be fairly familiar with measure theoretic mathematical analysis, but is not assumed to have any particular knowledge of probability theory (which is rapidly developed in Chapter 2 of the book)

2017 **160 pp** **Paperback**
978–1–4704–3734–3 **₹ 1,385.00**

Ordinary Differential Equations and Dynamical Systems

AMS

Gerald Teschl
University of Vienna, Austria



This book provides a self-contained introduction to ordinary differential equations and dynamical systems suitable for beginning graduate students. The first part begins with some simple examples of explicitly solvable equations and a first glance at qualitative methods. Then the fundamental results concerning the initial value problem are proved: existence, uniqueness, extensibility, dependence on initial conditions. Furthermore, linear equations are considered, including the Floquet theorem, and some perturbation results. The second part introduces the concept of a dynamical system. The Poincaré-Bendixson theorem is proved, and several examples of planar systems from classical mechanics, ecology, and electrical engineering are investigated. Finally, stability is studied, including the stable manifold and the Hartman-Grobman theorem for both continuous and discrete systems. The third part introduces chaos, beginning with the basics for iterated interval maps and ending with the Smale-Birkhoff theorem and the Melnikov method for homoclinic orbits.

Contents: *Preface* ◆ Part 1. Classical theory ◆ Chapter 1. Introduction ◆ Newton's equations ◆ Classification of differential equations ◆ First-order autonomous equations ◆ Finding explicit solutions ◆ Qualitative analysis of first-order equations ◆ Qualitative analysis of first-order periodic equations ◆ Chapter 2. Initial value problems ◆ Fixed point theorems ◆ The basic existence and uniqueness result ◆ Some extensions ◆ Dependence on the initial condition ◆ Regular perturbation theory ◆ Extensibility of solutions ◆ Euler's method and the Peano theorem ◆ Chapter

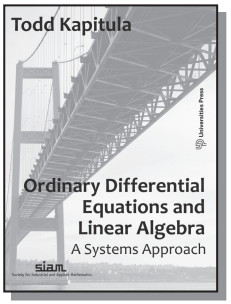
3. Linear equations ◆ The matrix exponential ◆ Linear autonomous first-order systems ◆ Linear autonomous equations of order n ◆ General linear first-order systems ◆ Linear equations of order n ◆ Periodic linear systems ◆ Perturbed linear first-order systems ◆ *Appendix: Jordan canonical form* ◆ Chapter 4. Differential equations in the complex domain ◆ The basic existence and uniqueness result ◆ The Frobenius method for second-order equations ◆ Linear systems with singularities ◆ The Frobenius method ◆ Chapter 5. Boundary value problems ◆ Introduction ◆ Compact symmetric operators ◆ Sturm–Liouville equations ◆ Regular Sturm–Liouville problems ◆ Oscillation theory ◆ Periodic Sturm–Liouville equations ◆ Part 2. Dynamical systems ◆ Chapter 6. Dynamical systems ◆ Dynamical systems ◆ The flow of an autonomous equation ◆ Orbits and invariant sets ◆ The Poincare map ◆ Stability of fixed points ◆ Stability via Liapunov's method ◆ Newton's equation in one dimension ◆ Chapter 7. Planar dynamical systems ◆ Examples from ecology ◆ Examples from electrical engineering ◆ The Poincare–Bendixson theorem ◆ Chapter 8. Higher dimensional dynamical systems ◆ Attracting sets ◆ The Lorenz equation ◆ Hamiltonian mechanics ◆ Completely integrable Hamiltonian systems ◆ The Kepler problem ◆ The KAM theorem ◆ Chapter 9. Local behavior near fixed points ◆ Stability of linear systems ◆ Stable and unstable manifolds ◆ The Hartman–Grobman theorem ◆ *Appendix: Integral equations* ◆ Part 3. Chaos ◆ Chapter 10. Discrete dynamical systems ◆ The logistic equation ◆ Fixed and periodic points ◆ Linear difference equations ◆ Local behavior near fixed points ◆ Chapter 11. Discrete dynamical systems in one dimension ◆ Period doubling ◆ Sarkovskii's theorem ◆ On the definition of chaos ◆ Cantor sets and the tent map ◆ Symbolic dynamics ◆ Strange attractors/repellers and fractal sets ◆ Homoclinic orbits as source for chaos ◆ Chapter 12. Periodic solutions ◆ Stability of periodic solutions ◆ The Poincar´e map ◆ Stable and unstable manifolds ◆ Melnikov's method for autonomous perturbations ◆ Melnikov's method for nonautonomous perturbations ◆ Chapter 13. Chaos in higher dimensional systems ◆ The Smale horseshoe ◆ The Smale–Birkhoff homoclinic theorem ◆ Melnikov's method for homoclinic orbits ◆ *Bibliographical notes* ◆ *Bibliography* ◆ *Glossary of notation* ◆ *Index*

2016	**368 pp**	**Paperback**
978–1–4704–2586–9		**₹ 1,330.00**

Ordinary Differential Equations and Linear Algebra: A Systems Approach

AMS

Todd Kapitula
University of New Mexico, Albuquerque, NM



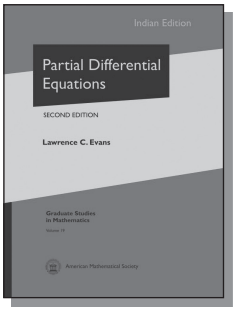
Ordinary differential equations (ODEs) and linear algebra are foundational postcalculus mathematics courses in the sciences. The goal of this text is to help students master both subject areas in a one-semester course. Linear algebra is developed first, with an eye toward solving linear systems of ODEs. A computer algebra system is used for intermediate calculations (Gaussian elimination, complicated integrals, etc.); however, the text is not tailored toward a particular system.

2017	**316 pp**	**Paperback**
978–93–86235–39–8		**₹ 960.00**

Partial Differential Equations (Second Edition)

AMS

Lawrence C Evans
Department of Mathematics, University of California, Berkeley, USA



This is the second edition of the now definitive text on partial differential equations (PDE). It offers a comprehensive survey of modern techniques in the theoretical study of PDE with particular emphasis on nonlinear equations. Its wide scope and clear

exposition make it a great text for a graduate course in PDE. For this edition, the author has made numerous changes, including

- a new chapter on nonlinear wave equations,
- more than 80 new exercises,
- several new sections,
- a significantly expanded bibliography.

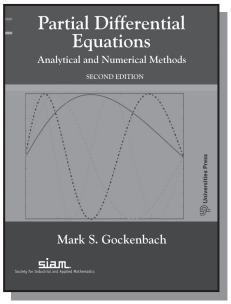
Contents: *Preface to second edition* ◆ *Preface to first edition* ◆ Introduction ◆ Four Important Linear PDE ◆ Nonlinear First-Order PDE ◆ Other Ways to Represent Solutions ◆ Sobolev Spaces ◆ Second-Order Elliptic Equations ◆ Linear Evolution Equations ◆ The Calculus of Variations ◆ Nonvariational Techniques ◆ Hamilton–Jacobi Equations ◆ Systems of Conservation Laws ◆ Nonlinear Wave Equations ◆ Appendix A: Notation ◆ Appendix B: Inequalities ◆ Appendix C: Calculus ◆ Appendix D: Functional Analysis ◆ Appendix E: Measure Theory ◆ *Bibliography* ◆ *Index*

2014	**776 pp**	**Paperback**
978–1–4704–1497–9		**₹ 2,250.00**

Partial Differential Equations: Analytical and Numerical Methods, (Second Edition)

AMS

Mark S Gockenbach
Michigan Technological University, Houghton, MI



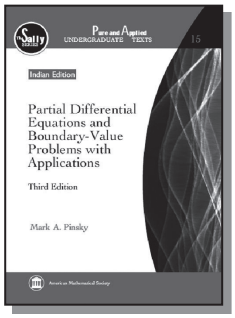
Partial differential equations (PDEs) are essential for modelling many physical phenomena. This undergraduate textbook introduces students to the topic with a unique approach that emphasises the modern finite element method alongside the classical method of Fourier analysis. Additional features of this new edition include broader coverage of PDE methods and applications, with new chapters on the method of characteristics, Sturm–Liouville problems, and Green's functions, and a new section on the finite difference method for the wave equation. The author continues to emphasise Fourier series and finite element methods, which were the primary scope of the first edition. The book also features emphasis on linear algebra, particularly the idea of best approximation; realistic physical parameters and meaningful experiments for many of the examples and exercises; and tutorials for the most popular software (MATLAB™, Mathematica™, and Maple™) that can be used to reproduce the examples and solve the exercises.

2017	**676 pp**	**Paperback**
978–93–86235–40–4		**₹ 1,650.00**

Partial Differential Equations and Boundary–Value Problems with Applications (Third Edition)

AMS

Mark A Pinsky
Northwestern University, Evanston, USA



Building on the basic techniques of separation of variables and Fourier series, the book presents the solution of boundary-value problems for basic partial differential equations: the heat equation, wave equation, and Laplace equation, considered in various standard coordinate systems--rectangular, cylindrical, and spherical. Each of the equations is derived in the three-dimensional context; the solutions are organized according to the geometry of the coordinate system, which makes the mathematics especially transparent. Bessel and Legendre functions are studied and used whenever appropriate throughout the text. The notions of steady-state solution of closely related stationary solutions are developed for the heat equation; applications to the study of heat flow in the earth are presented. The problem of the vibrating string is studied in detail both in the

Fourier transform setting and from the viewpoint of the explicit representation (d'Alembert formula). Additional chapters include the numerical analysis of solutions and the method of Green's functions for solutions of partial differential equations. The exposition also includes asymptotic methods (Laplace transform and stationary phase).

With more than 200 working examples and 700 exercises (more than 450 with answers), the book is suitable for an undergraduate course in partial differential equations.

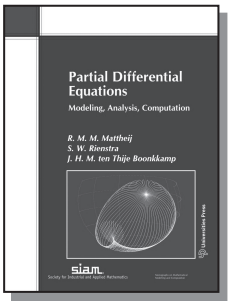
Contents: Preliminaries ◆ Fourier Series ◆ Boundary-Value Problems In Rectangular ◆ Coordinates Boundary-Value Problems in ◆ Cylindrical Coordinates Boundary-Value Problems in Spherical Coordinates ◆ Fourier Transforms and Applications ◆ Asymptotic Analysis ◆ Numerical ◆ Analysis Green's Functions ◆ *Appendices* ◆ *Answers to Selected Exercises* ◆ *Index about the Author*

2013	544 pp	Paperback
978-1-4704-0914-2		₹1,450.00

Partial Differential Equations: Modeling, Analysis, Computation

AMS

Mattheij R M M, Rienstra S W, ten Thije Boonkkamp J H M
Technische Universiteit Eindhoven, The Netherlands



This book enables readers to deepen their understanding of a topic ubiquitous in mathematics and science and to tackle practical problems. The advent of fast computers and the development of numerical methods have enabled the modern engineer to use a large variety of packages to find numerical approximations to solutions of PDEs. Problems are usually standard and a thorough knowledge of a well-chosen subset of analytical and numerical tools and methodologies is necessary when dealing with real-life problems. When one is dealing with PDEs in practice, it becomes clear that both numerical and analytical treatments of the problem are needed.

2017	704 pp	Paperback
978-93-86235-41-1		₹1,740.00

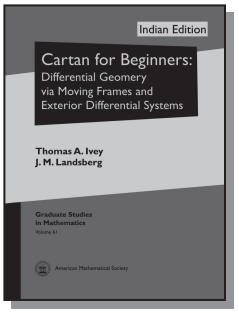
Differential Geometry

Cartan for Beginners: Differential Geometry via Moving Frames and Exterior Differential Systems

AMS

Thomas A Ivey
College of Charleston, Charleston, USA

J M Landsberg
Georgia Institute of Technology, Atlanta, USA



This book is an introduction to Cartan's approach to differential geometry. Two central methods in Cartan's geometry are the theory of exterior differential systems and the method of moving frames. This book presents thorough and modern treatments of both subjects, including their applications to both classic and contemporary problems.

It begins with the classical geometry of surfaces and basic Riemannian geometry in the language of moving frames, along with an elementary introduction to exterior differential systems. Key concepts are developed incrementally with motivating examples leading to definitions, theorems, and proofs.

Once the basics of the methods are established, the authors develop applications and advanced topics. One notable application is to complex algebraic geometry, where they expand and update important results from projective differential geometry.

The book features an introduction to G-structures and a treatment of the theory of connections. The Cartan machinery is also applied to obtain explicit solutions of PDEs via Darboux's method, the method of characteristics, and Cartan's method of equivalence.

This text is suitable for a one-year graduate course in differential geometry, and parts of it can be used for a one-semester course. It has numerous exercises and examples throughout. It will also be useful to experts in areas such as PDEs and algebraic geometry who want to learn how moving frames and exterior differential systems apply to their fields.

Contents: Moving frames and exterior differential systems ◆ Euclidean geometry and Riemannian geometry ◆ Projective geometry ◆ Cartan-Kahler I: Linear algebra and constant-coefficient homogeneous systems ◆ Cartan-Kahler II: The Cartan algorithm for linear Pfaffian systems ◆ Applications to PDE ◆ Cartan-Kahler III: The general case ◆ Geometric structures and connections ◆ Linear algebra and representation theory ◆ Differential forms ◆ Complex structures and complex manifolds ◆ Initial value problems ◆ Hints and answers to selected exercises ◆ *Bibliography* ◆ *Index*

2012	392 pp	Paperback
978-0-8218-8717-2		₹ 1,330.00

Curves and Surfaces (Second Edition)

AMS

Sebastián Montiel
Professor of Geometry and Topology, University of Granada, Spain

Antonio Ros
Department of Geometry, University of Granada, Spain

This introductory textbook puts forth a clear and focused point of view on the differential geometry of curves and surfaces. Following the modern point of view on differential geometry, the book emphasizes the global aspects of the subject. *The excellent collection of examples and exercises (with hints) will help students in learning the material. Advanced undergraduates and graduate students will find this a nice entry point to differential geometry*. In order to study the global properties of curves and surfaces, it is necessary to have more sophisticated tools than are usually found in textbooks on the topic. In particular, students must have a firm grasp on certain topological theories. Indeed, this monograph treats the Gauss–Bonnet theorem and discusses the Euler characteristic. The authors also cover Alexandrov's theorem on embedded compact surfaces in R^3 with constant mean curvature. The last chapter addresses the global geometry of curves, including periodic space curves and the four-vertices theorem for plane curves that are not necessarily convex. Besides being an introduction to the lively subject of curves and surfaces, this book can also be used as an entry to a wider study of differential geometry. *It is suitable as the text for a first-year graduate course or an advanced undergraduate course.*

Contents: Plane and Space Curves ◆ Surfaces in Euclidean Space ◆ The Second Fundamental Form ◆ Separation and Orientability ◆ Integration on Surfaces ◆ Global Extrinsic Geometry ◆ Intrinsic Geometry of Surfaces ◆ The Gauss–Bonnet Theorem ◆ Global Geometry of Curves ◆ *Bibliography* ◆ *Index*

2011	392 pp	Paperback
978-0-8218-6880-5		₹ 1,270.00

Differential Geometry, Lie Groups, and Symmetric Spaces

AMS

Sigurdur Helgason
Massachusetts Institute of Technology, Cambridge, USA

For many years and for many mathematicians, Sigurdur Helgason's classic has been—and continues to be—the standard source for this material.

Helgason begins with a concise, self-contained introduction to differential geometry. He then introduces Lie groups and Lie algebras, including important results on their structure. This sets the stage for the introduction and study of symmetric spaces, which form the central part of the book. The text concludes with the classification of symmetric spaces by means of the Killing-Cartan classification of simple Lie algebras over C and Cartan's classification of simple Lie algebras over R.

The excellent exposition is supplemented by extensive collections of useful exercises at the

end of each chapter. All the problems have either solutions or substantial hints, found at the back of the book. For this latest edition, Helgason has made corrections and added helpful notes and useful references.

Sigurdur Helgason was awarded the Steele Prize for Differential Geometry, Lie Groups, and Symmetric Spaces and Groups and Geometric Analysis.

2010	668 pp	Paperback
978-0-8218-5217-0		₹ 1,985.00

Geometric Analysis on Symmetric Spaces

AMS

Sigurdur Helgason
Massachusetts Institute of Technology, Cambridge, USA

This book gives the first systematic exposition of geometric analysis on Riemannian symmetric spaces and its relationship to the representation theory of Lie groups. The book starts with modern integral geometry for double fibrations and treats several examples in detail. After discussing the theory of Radon transforms and Fourier transforms on symmetric spaces, inversion formulas, and range theorems, Helgason examines applications to invariant differential equations on symmetric spaces, existence theorems, and explicit solution formulas, particularly potential theory and wave equations. The canonical multitemporal wave equation on a symmetric space is included. The book concludes with a chapter on eigenspace representations—that is, representations on solution spaces of invariant differential equations. *Known for his high-quality expositions, Helgason received the 1988 Steele Prize for his earlier books Differential Geometry, Lie Groups and Symmetric Spaces and Groups and Geometric Analysis. Containing exercises (with solutions) and references to further results, this revised edition would be suitable for advanced graduate courses in modern integral geometry, analysis on Lie groups, and representation theory of Lie groups.*

Contents: A Duality in Integral Geometry ◆ A Duality for Symmetric Spaces ◆ The Fourier Transform on a Symmetric Space ◆ The Radon Transform on X and on Xo ◆ Differential Equations on Symmetric Spaces ◆ Eigenspace Representations ◆ *Solutions to Exercises* ◆ *Bibliography* ◆ *Symbols Frequently Used* ◆ *Index*

2011	656 pp	Paperback
978-0-8218-6895-9		₹ 2,025.00

Global Calculus

AMS

S Ramanan
Chennai Mathematics Institute, India

Analysis, topology and algebra brought new power to geometry, revolutionising the way geometers and physicists look at conceptual problems. Some of the key ingredients in this interplay are sheaves, cohomology, Lie groups, connections and differential operators. In *Global Calculus*, the appropriate formalism for these topics is laid out with numerous examples and applications by one of the experts in differential and algebraic geometry. Ramanan has chosen an uncommon but natural path through the subject. In this almost completely self-contained account, these topics are developed from scratch. The basics of Fourier transforms, Sobolev theory and interior regularity are proved at the same time as symbol calculus, culminating in beautiful results in global analysis, real and complex. *Many new perspectives on traditional and modern questions of differential analysis and geometry are the hallmarks of the book. The book is suitable for a first year graduate course on global analysis.*

Contents: Sheaves and differential manifolds: Definitions and examples ◆ Differential operators ◆ Integration on differential manifolds ◆ Cohomology of sheaves and applications ◆ Connections on principal and vector bundles ◆ Lifting of symbols ◆ Linear connections ◆ Manifolds with additional structures ◆ Local analysis of elliptic operators ◆ Vanishing theorems and applications ◆ *Appendix* ◆ *Bibliography* ◆ *Index*

2009	328 pp	Paperback
978-0-8218-4860-9		₹ 1,430.00

Hamilton's Ricci Flow

AMS

Bennett Chow
University of California, San Diego, La Jolla, USA

Peng Lu
University of Oregon, Eugene, USA

Lei Ni
University of California, San Diego, La Jolla, USA

Ricci flow is a powerful analytic method for studying the geometry and topology of manifolds. *This book is an introduction to Ricci flow for graduate students and mathematicians interested in working in the subject.* To this end, the first chapter is a review of the relevant basics of Riemannian geometry. *For the benefit of the student, the text includes a number of exercises of varying difficulty.*

The book also provides brief introductions to some general methods of geometric analysis and other geometric flows. Comparisons are made between the Ricci flow and the linear heat equation, mean curvature flow, and other geometric evolution equations whenever possible.

Several topics of Hamilton's program are covered, such as short time existence, Harnack inequalities, Ricci solutions, Perelman's no local collapsing theorem, singularity analysis, and ancient solutions.

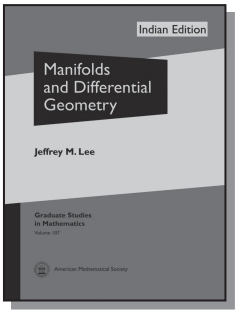
A major direction in Ricci flow, via Hamilton's and Perelman's works, is the use of Ricci flow as an approach to solving the Poincaré conjecture and Thurston's geometrization conjecture.

2010 **646 pp** **Paperback**
978-0-8218-5221-7 **₹ 2,385.00**

Manifolds and Differential Geometry

AMS

Jeffrey M Lee
Texas Tech University, Lubbock, USA



Differential geometry began as the study of curves and surfaces using the methods of calculus. In time, the notions of curve and surface were generalized along with associated notions such as length, volume, and curvature. At the same time the topic has become closely allied with developments in topology. The basic object is a smooth manifold, to which some extra structure has been attached, such as a Riemannian metric, a symplectic form, a distinguished group of symmetries, or a connection on the tangent bundle.

This book is a graduate-level introduction to the tools and structures of modern differential geometry. Included are the topics usually found in a course on differentiable manifolds, such as vector bundles, tensors, differential forms, de Rham cohomology, the Frobenius theorem and basic Lie group theory. The book also contains material on the general theory of connections on vector bundles and an in-depth chapter on semi-Riemannian geometry that covers basic material about Riemannian manifolds and Lorentz manifolds. *An unusual feature of the book is the inclusion of an early chapter on the differential geometry of hypersurfaces in Euclidean space.* There is also a section that derives the exterior calculus version of Maxwell's equations.

The first chapters of the book are suitable for a one-semester course on manifolds. There is more than enough material for a year-long course on manifolds and geometry.

The book is intended for students and teachers of mathematics from high school through graduate school. It should also be of interest to

working mathematicians who are curious about mathematical results in fields other than their own. It can be used by teachers at all of the above mentioned levels for the enhancement of standard curriculum materials or extra-curricular projects.

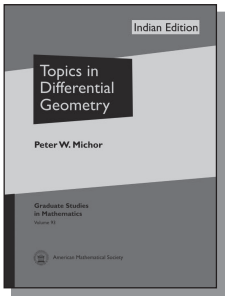
Contents: Differentiable Manifolds ◆ The Tangent Structure ◆ Immersion and Submersion ◆ Curves and Hypersurfaces in Euclidean Space ◆ Lie Groups ◆ Fiber Bundles ◆ Tensors ◆ Differential Forms ◆ Integration and Stokes' Theorem ◆ De Rham Cohomology ◆ Distributions and Frobenius' Theorem ◆ Connections and Covariant Derivatives ◆ Riemannian and Semi-Riemannian Geometry ◆ *Appendix A. The Language of Category Theory* ◆ *Appendix B. Topology* ◆ *Appendix C. Some Calculus Theorems* ◆ *Appendix D. Modules and Multilinearity* ◆ *Bibliography* ◆ *Index*

2012	**688 pp**	**Paperback**
978-0-8218-8713-4		**₹ 1,570.00**

Topics in Differential Geometry

AMS

Peter W Michor
Universität Wien, Austria; Erwin Schrödinger Institut für Mathematische Physik, Wien, Austria



This book treats the fundamentals of differential geometry: manifolds, flows, Lie groups and their actions, invariant theory, differential forms and de Rham cohomology, bundles and connections, Riemann manifolds, isometric actions, and symplectic and Poisson geometry.

The layout of the material stresses naturality and functoriality from the beginning and is as coordinate-free as possible. Coordinate formulas are always derived as extra information. *Some attractive unusual aspects of this book are as follows*:

- Initial submanifolds and the Frobenius theorem for distributions of nonconstant rank (the Stefan-Sussman theory) are discussed.
- Lie groups and their actions are treated early on, including the slice theorem and invariant theory.
- De Rham cohomology includes that of compact Lie groups, leading to the study of (nonabelian) extensions of Lie algebras and Lie groups.
- The Frölicher–Nijenhuis bracket for tangent bundle valued differential forms is used to express any kind of curvature and second Bianchi identity, even for fiber bundles (without structure groups). Riemann geometry starts with a careful treatment of connections to geodesic structures to sprays to connectors and back to connections, going via the second and third tangent bundles. The Jacobi flow on the second tangent bundle is a new aspect coming from this point of view.
- Symplectic and Poisson geometry emphasizes group actions, momentum mappings, and reductions.

This book gives the careful reader working knowledge in a wide range of topics of modern coordinate-free differential geometry in not too many pages. A prerequisite for using this book is a good knowledge of undergraduate analysis and linear algebra.

Contents: Manifolds and Vector Fields ◆ Lie Groups and Group Actions ◆ Differential Forms and de Rham Cohomology ◆ Bundles and Connections ◆ Riemann Manifolds ◆ Isometric Group Actions or Riemann G-Manifolds ◆ Symplectic and Poisson Geometry ◆ *List of Symbols* ◆ *Bibliography* ◆ *Index*

2012	**508 pp**	**Paperback**
978-0-8218-8721-9		**₹ 1,740.00**

Discrete Mathematics

Boolean Functions in Coding Theory and Cryptography

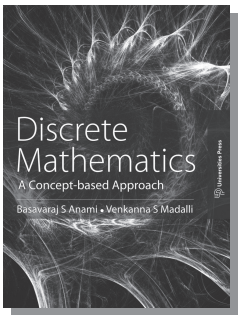
Logachev O A, Salnikov A A, Yashchenko V V
Moscow State University, Moscow, Russia

See page 55

Discrete Mathematics: A Concept–based Approach

Basavaraj S Anami
Principal, KLE Institute of Technology, Hubballi

Venkanna S Madalli
Professor, Department of MCA, KLE Institute of Technology, Hubballi



Online resources available

Discrete Mathematics: A Concept-based Approach focuses on the applications of discrete mathematical concepts to real-life scenarios and makes the subject appealing to the student. It caters to the syllabus requirement of students of mathematics and computer science at the undergraduate and postgraduate levels in distinguished engineering colleges. The flow of the topics is gradual and designed to lead the students step by step from the first principles to the advanced topics. The sequencing of the book's contents reflect the order and manner in which the subject in normally approached in the classroom. Each topic is supported by appropriate examples from computer science to showcase the application of discrete mathematics in the field of computers. This book can also be used as a foundation course for studying advanced mathematical concepts. PowerPoint slides that encapsulate the essential points of each chapter, solutions to chapter-end exercises and solved university question papers are available as online supplements.

Online resource available at:
www.universitiespress.com/basavarajsanami/discretemathematics

Contents: *Foreword* ◆ *Preface* ◆ *Acknowledgements* ◆ *About the Authors* ◆ Overview of Disciplines in Mathematics ◆ Fundamentals of Mathematical Logic ◆ Mathematical Induction ◆ Introduction to Set Theory ◆ Relations and Operations ◆ General Functions and Growth Functions ◆ Algebraic Structures ◆ Coding Theory ◆ Fundamentals of Counting Principles ◆ Introduction to Probability ◆ Finite State Machine ◆ Introduction to Recurrence Relations ◆ Introduction to Graph Theory ◆ *Bibliography* ◆ *Index*

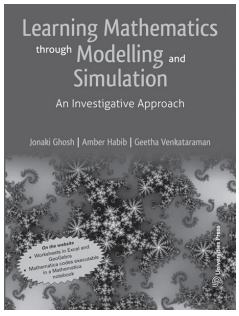
2016	376 pp	Paperback
978–81–7371–999–8		₹ 795.00

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India

Amber Habib
Shiv Nadar Institution of Eminence, Delhi NCR, India

Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India



Online resources available

This book offers the readers a hands-on experience of discovering the beautiful aspects of mathematicsthrough the use of technology. Three powerful tools falling into the categories of spreadsheet programs (Microsoft Excel),dynamic geometry software (GeoGebra) and computer algebra systems (Mathematica), are introduced. They are applied in the book to enablethe readers to independently explore, visualise, conjecture, reason and solve problems.

The book highlightsthe role of mathematical software in enabling explorations leading to a deeper insight into the problems.Technology is used to generate phenomena and acquire data from which questions naturally arise and createa demand for appropriate theory.

Readers are introduced to the applications of

Calculus, Probability, Number Theory, Linear Algebra andDiscrete Mathematics. Each chapter includes a set of exercises, called Investigations, thatprompt analytical thinking, encourage exploration of a concept, or test the readers' ability to apply theconcept to a realistic problem situation.

High school students, undergraduates and any reader keen to learn interesting mathematics with the help of technology will find this book both useful and enjoyable.

Online resource available at:
www.universitiespress.com/
LearningMathsThroughMandS

Contents: *Preface* ⋄ *Acknowledgements* ⋄ Monte Carlo Methods: Estimating π ⋄ Exploring Probability through Simulation ⋄ Graph Theory: Seven Bridges Problem and the Tower of Hanoi ⋄ The Mathematics of Ciphers: Public Key Encryption and RSA ⋄ Exploring Fractals ⋄ The Newton–Raphson Method and Fractals ⋄ Experiments in Symmetry: Frieze and Wallpaper Patterns ⋄ Applications of Matrices ⋄ Introduction to Software ⋄ Investigations: Hints and Results ⋄ Bibliography ⋄ Image Credits ⋄ *Subject Index* ⋄ *Index of Names*

2022	**256 pp**	**Paperback**
978–93–93330–38–3		**₹ 750.00**

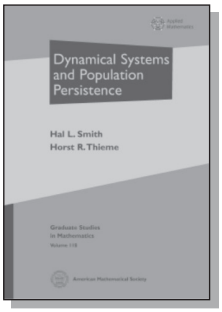
Dynamical Systems

Dynamical Systems and Population Persistence

AMS

Hal L Smith
Arizona State University, Tempe, USA

Horst R Thieme
Arizona State University, Tempe, USA



The mathematical theory of persistence answers questions such as which species, in a mathematical model of interacting species, will survive over the long term. It applies to infinite-dimensional as well as to finite-dimensional dynamical systems, and to discrete-time as well as to continuous-time semiflows. This book provides a self-contained treatment of persistence theory that is accessible to graduate students. Applications play a large role from the beginning. These include ode models such as an seirs infectious disease in a meta-population and discrete-time nonlinear matrix models of demographic dynamics. Entire chapters are devoted to infinite-dimensional examples including an si epidemic model with variable infectivity, microbial growth in a tubular bioreactor, and an age-structured model of cells growing in a chemostat.

Contents: *Preface* ⋄ *Introduction* ⋄ Chapter 1. Semiflows on Metric Spaces ⋄ Metric spaces ⋄ Semiflows ⋄ Invariant sets ⋄ Exercises ⋄ Chapter 2. Compact Attractors ⋄ Compact attractors of individual sets ⋄ Compact attractors of classes of sets ⋄ A sufficient condition for asymptotic smoothness ⋄ α-limit sets of total trajectories ⋄ Invariant sets identified through Lyapunov functions ⋄ Discrete semiflows induced by weak contractions ⋄ Exercises ⋄ Chapter 3. Uniform Weak Persistence ⋄ Persistence definitions ⋄ An SEIRS epidemic model in patchy host populations ⋄ Nonlinear matrix models: Prolog ⋄ The May-Leonard example of cyclic competition ⋄ Exercises ⋄ Chapter 4. Uniform Persistence ⋄ From uniform weak to uniform persistence ⋄ From uniform weak to uniform persistence: Discrete case ⋄ Application to a metered endemic model of SIR type ⋄ From uniform weak to uniform persistence for time-set R+ ⋄ Persistence `a la Baron von M¨unchhausen ⋄ Navigating between alternative persistence functions ⋄ A fertility reducing endemic with two stages of infection ⋄ Exercises ⋄ Chapter 5. The Interplay of

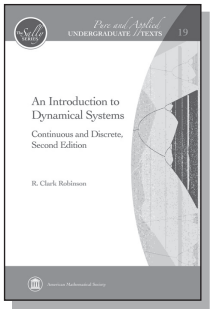
Attractors, Repellers, and Persistence ◆ An attractor of points facilitates persistence ◆ Partition of the global attractor under uniform persistence ◆ Repellers and dual attractors ◆ The cyclic competition model of May and Leonard revisited ◆ Attractors at the brink of extinction ◆ An attractor under two persistence functions ◆ Persistence of bacteria and phages in a chemostat ◆ Exercises ◆ Chapter 6. Existence of Nontrivial Fixed Points via Persistence ◆ Nontrivial fixed points in the global compact attractor ◆ Periodic solutions of the Lotka-Volterra predator-prey model ◆ Exercises ◆ Chapter 7. Nonlinear Matrix Models: Main Act ◆ Forward invariant balls and compact attractors of bounded sets ◆ Existence of nontrivial fixed points ◆ Uniform persistence and persistence attractors ◆ Stage persistence ◆ Exercises ◆ Chapter 8. Topological Approaches to Persistence ◆ Attractors and repellers ◆ Chain transitivity and the Butler-McGehee lemma ◆ Acyclicity implies uniform weak persistence 185 ◆ Uniform persistence in a food chain ◆ The metered endemic model revisited ◆ Nonlinear matrix models (epilog): Biennials ◆ An endemic with vaccination and temporary immunity ◆ Lyapunov exponents and persistence for ODEs and maps ◆ Exercises ◆ Chapter 9. An SI Endemic Model with Variable Infectivity ◆ The model ◆ Host persistence and disease extinction ◆ Uniform weak disease persistence ◆ The semiflow ◆ Existence of a global compact attractor ◆ Uniform disease persistence ◆ Disease extinction and the disease-free equilibrium ◆ The endemic equilibrium ◆ Persistence as a crossroad to global stability ◆ Measure-valued distributions of infection-age ◆ Chapter 10. Semiflows Induced by Semilinear Cauchy Problems ◆ Classical, integral, and mild solutions ◆ Semiflow via Lipschitz condition and contraction principle ◆ Compactness all the way ◆ Total trajectories ◆ Positive solutions: The low road ◆ Heterogeneous time-autonomous boundary conditions ◆ Chapter 11. Microbial Growth in a Tubular Bioreactor ◆ Model description ◆ The no-bacteria invariant set ◆ The solution semiflow ◆ Bounds on solutions and the global attractor ◆ Stability of the washout equilibrium ◆ Persistence of the microbial population ◆ Exercises ◆ Chapter 12. Dividing Cells in a Chemostat ◆ An integral equation ◆ A C0-semigroup ◆ A semilinear Cauchy problem ◆ Extinction and weak persistence via Laplace transform ◆ Exercises ◆ Chapter 13. Persistence for Nonautonomous Dynamical Systems ◆ The simple chemostat with time-dependent washout rate ◆ General time-heterogeneity ◆ Periodic and asymptotically periodic semiflows ◆ Uniform persistence of the cell population ◆ Exercises ◆ Chapter 14. Forced Persistence in Linear Cauchy Problems ◆ Uniform weak persistence and asymptotic Abel-averages ◆ A compact attracting set ◆ Uniform persistence in ordered Banach space ◆ Chapter 15. Persistence via Average Lyapunov Functions ◆ Weak average Lyapunov functions ◆ Strong average Lyapunov functions ◆ The time-heterogeneous hypercycle equation ◆ Exercises ◆ *Appendix A. Tools from Analysis and Differential Equations ◆ A.1. Lower one-sided derivatives ◆ A.2. Absolutely continuous functions ◆ A.3. The method of fluctuation ◆ A.4. Differential inequalities and positivity of solutions ◆ A.5. Perron-Frobenius theory ◆ A.6. Exercises ◆ Appendix B. Tools from Functional Analysis and Integral Equations ◆ B.1. Compact sets in Lp(R+) ◆ B.2. Volterra integral equations ◆ B.3. Fourier transform methods for integro-differential equations ◆ B.4. Closed linear operators ◆ B.5. Exercises ◆ Bibliography ◆ Index*

2016	**424 pp**	**Paperback**
978–1–4704–2561–6		**₹ 1,670.00**

Introduction to Dynamical Systems, An: Continuous and Discrete (Second Edition)

AMS PRINT ON DEMAND

R Clark Robinson
Northwestern University, Evanston, USA



This book gives a mathematical treatment of the introduction to qualitative differential equations and discrete dynamical systems. The treatment includes theoretical proofs, methods of calculation, and applications. The two parts of the book, continuous time of differential equations and discrete time of dynamical systems, can be covered independently in one semester each or combined together into a year-long course. The material on differential equations introduces the qualitative or

geometric approach through a treatment of linear systems in any dimension. There follows chapters where equilibria are the most important feature, where scalar (energy) functions is the principal tool, where periodic orbits appear, and finally, chaotic systems of differential equations. The many different approaches are systematically introduced through examples and theorems. The material on discrete dynamical systems starts with maps of one variable and proceeds to systems in higher dimensions. The treatment starts with examples where the periodic points can be found explicitly and then introduces symbolic dynamics to analyze where they can be shown to exist but not given in explicit form. Chaotic systems are presented both mathematically and more computationally using Lyapunov exponents. With the one-dimensional maps as models, the multidimensional maps cover the same material in higher dimensions. This higher dimensional material is less computational and more conceptual and theoretical. The final chapter on fractals introduces various dimensions which is another computational tool for measuring the complexity of a system. It also treats iterated function systems which give examples of complicated sets. The material on differential equations introduces the qualitative or geometric approach through a treatment of linear systems in any dimension. There follows chapters where equilibria are the most important feature, where scalar (energy) functions is the principal tool, where periodic orbits appear, and finally, chaotic systems of differential equations. The many different approaches are systematically introduced through examples and theorems. In the second edition of the book, much of the material has been rewritten to clarify the presentation. Also, some new material has been included in both parts of the book.

Contents: *Preface* ◆ *Historical Prologue* ◆ Part 1. Systems of Nonlinear Differential Equations ◆ Chapter 1. Geometric Approach to Differential Equations ◆ Chapter 2. Linear Systems ◆ Fundamental Set of Solutions ◆ Constant Coefficients: Solutions and Phase Portraits ◆ Nonhomogeneous Systems: Time-dependent Forcing ◆ Applications ◆ Theory and Proofs ◆ Chapter 3. The Flow: Solutions of Nonlinear Equations ◆ Solutions of Nonlinear Equations ◆ Numerical Solutions of Differential Equations ◆ Theory and Proofs ◆ Chapter 4. Phase Portraits with Emphasis on Fixed Points ◆ Limit Sets ◆ Stability of Fixed Points ◆ Scalar Equations ◆ Two Dimensions and Nullclines ◆ Linearized Stability of Fixed Points ◆ Competitive Populations ◆ Applications ◆ Theory and Proofs ◆ Chapter 5. Phase Portraits Using Scalar Functions ◆ Predator–Prey Systems ◆ Undamped Forces ◆ Lyapunov Functions for Damped Systems ◆ Bounding Functions ◆ Gradient Systems ◆ Applications ◆ Theory and Proofs ◆ Chapter 6. Periodic Orbits ◆ Introduction to Periodic Orbits ◆ Poincare–Bendixson Theorem ◆ Self-Excited Oscillator ◆ Andronov–Hopf ◆ Homoclinic Bifurcation ◆ Rate of Change of Volume ◆ Poincare Map ◆ Applications ◆ Theory and Proofs ◆ Chapter 7. Chaotic Attractors ◆ Attractors ◆ Chaotic Attractors ◆ Lorenz System ◆ Rossler Attractor ◆ Forced Oscillator ◆ Lyapunov Exponents ◆ Test for Chaotic Attractors ◆ Applications ◆ Theory and Proofs ◆ Part 2. Iteration of Functions ◆ Chapter 8. Iteration of Functions as Dynamics ◆ One-Dimensional Maps ◆ Functions with Several Variables ◆ Chapter 9. Periodic Points of One-Dimensional Maps ◆ Periodic Points ◆ Iteration Using the Graph ◆ Stability of Periodic Points ◆ Critical Points and Basins ◆ Bifurcation of Periodic Points ◆ Conjugacy ◆ Applications ◆ Theory and Proofs ◆ Chapter 10. Itineraries for One-Dimensional Maps ◆ Periodic Points from Transition Graphs ◆ Topological Transitivity ◆ Sequences of Symbols ◆ Sensitive Dependence on Initial Conditions ◆ Cantor Sets ◆ Piecewise Expanding Maps and Subshifts ◆ Applications ◆ Theory and Proofs ◆ Chapter 11. Invariant Sets for One-Dimensional Maps ◆ Limit Sets ◆ Chaotic Attractors ◆ Lyapunov Exponents ◆ Invariant Measures ◆ Applications ◆ Theory and Proofs ◆ Chapter 12. Periodic Points of Higher Dimensional Maps ◆ Dynamics of Linear Maps ◆ Classification of Periodic Points ◆ Stable Manifolds ◆ Hyperbolic Toral Automorphisms ◆ Theory and Proofs ◆ Chapter 13. Invariant Sets for Higher Dimensional Maps ◆ Geometric Horseshoe ◆ Symbolic Dynamics ◆ Homoclinic Points and Horseshoes ◆ Attractors ◆ Lyapunov Exponents ◆ Applications ◆ Theory and Proofs ◆ Chapter 14. Fractals ◆ Box Dimension ◆ Dimension of Orbits ◆ Iterated-Function Systems ◆ Theory and Proofs ◆ *Appendix A. Background and Terminology* ◆ *A.1. Calculus Background and Notation* ◆ *A.2. Analysis and Topology Terminology* ◆ *A.3. Matrix Algebra* ◆ *Appendix B. Generic Properties* ◆ *Bibliography* ◆ *Index*

2016 **756 pp** **Paperback**
978–1–4704–2580–7 **₹1,825.00**

Invitation to Ergodic Theory

AMS

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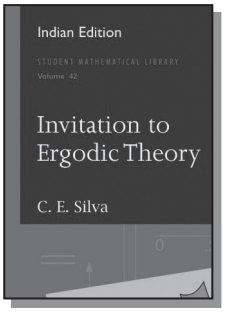


This book is an introduction to basic concepts in ergodic theory such as recurrence, ergodicity, the ergodic theorem, mixing, and weak mixing. It does not assume knowledge of measure theory; all the results needed from measure theory are presented from scratch. In particular, the book includes a detailed construction of the Lebesgue measure on the real line and an introduction to measure spaces up to the Carathéodory extension theorem. It also develops the Lebesgue theory of integration, including the dominated convergence theorem and an introduction to the Lebesgue Lp spaces.

Several examples of a dynamical system are developed in detail to illustrate various dynamical concepts. These include in particular the baker's transformation, irrational rotations, the dyadic odometer, the Hajian-Kakutani transformation, the Gauss transformation, and the Chacón transformation. There is a detailed discussion of cutting and stacking transformations in ergodic theory. The book includes several exercises and some open questions to give the flavor of current research. The book also introduces some notions from topological dynamics, such as minimality, transitivity and symbolic spaces; and develops some metric topology, including the Baire category theorem.

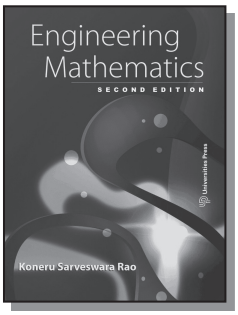
Contents: Introduction ⋄ Lebesgue measure ⋄ Recurrence and ergodicity ⋄ The Lebesgue integral ⋄ The ergodic theorem ⋄ Mixing notions ⋄ *Appendix A: Set notation and the completeness of R* ⋄ *Appendix B: Topology of R and metric spaces* ⋄ *Bibliographical notes* ⋄ *Bibliography* ⋄ *Index*

2012	272 pp	Paperback
978–0–8218–8733–2		₹ 1,395.00

Engineering Mathematics

Engineering Mathematics
(Second Edition)

Koneru Sarveswara Rao
Formerly Professor, Department of Mathematics, Indian Institute of Technology Bombay, Mumbai, India



This book deals with the branches of mathematics required by engineers in their various fields of study. The topics covered include sequences and series, mean value theorems, evolutes, functions of several variables, solutions of ordinary and partial differential equations, Laplace, Fourier and Z-transforms, along with their applications. In the revised edition, solutions of differential equations in series, beta and gamma functions, analytical geometry in three dimensions and complex analysis have been added. In addition, there are chapters on vector calculus, matrices, Fourier series and numerical algorithms, and together, the above provide a fairly comprehensive coverage of mathematics for engineering. *The book can serve as a textbook for undergraduate programmes in engineering as well as science.*

Contents: *Foreword* ⋄ *Preface to Second Edition* ⋄ *Preface to First Edition* ⋄ Sequences and infinite series ⋄ Mean value theorems, envelopes and evolutes ⋄ Ordinary differential equations of first order ⋄ Linear differential equations of second and higher order ⋄ Laplace transforms ⋄ Solution of differential equations in series Legendre polynomials and Bessel functions ⋄ Beta and Gamma functions ⋄ Analytical Geometry in three dimensions Functions of several variables ⋄ Curve tracing and some properties of polar curves ⋄ Lengths, volumes, surface areas and multiple integrals ⋄ Vector calculus; Matrices and linear systems ⋄ Eigen values and eigen vectors

◆ Fourier Series ◆ Complex Analysis ◆ Partial Differential Equations ◆ Applications of Partial Differential Equations ◆ Fourier and Z-Transforms ◆ Probability ◆ Random Variables and Probability Distributions ◆ Joint Distributions ◆ Sampling Distributions ◆ Statistical Estimation and Inference Curve Fitting, Regression and Correlation ◆ Numerical Methods ◆ *Epilogue*

Available in print and e-book formats.
For details, visit www.universitiespress.com.

2012	**704 pp**	**Paperback**
978-81-7371-772-7		**₹ 910.00**

Fourier Analysis

Fourier Analysis

AMS

Javier Duoandikoetxea
Universidad del País Vasco/Euskal Herriko Unibertsitatea, Bilbao, Spain

Fourier analysis encompasses a variety of perspectives and techniques. This volume presents the real variable methods of Fourier analysis introduced by Calderón and Zygmund. The text was born from a graduate course taught at the Universidad Autónoma de Madrid and incorporates lecture notes from a course taught by José Luis Rubio de Francia at the same university.

Motivated by the study of Fourier series and integrals, classical topics are introduced, such as the Hardy–Littlewood maximal function and the Hilbert transform. The remaining portions of the text are devoted to the study of singular integral operators and multipliers. Both classical aspects of the theory and more recent developments, such as weighted inequalities, H1, BMO spaces, and the T1 theorem, are discussed.

Chapter 1 presents a review of Fourier series and integrals; *Chapters 2* and *3* introduce two operators that are basic to the field: the Hardy-Littlewood maximal function and the Hilbert transform. *Chapters 4* and *5* discuss singular integrals, including modern generalizations. *Chapter 6* studies the relationship between H1, BMO, and singular integrals; *Chapter 7* presents the elementary theory of weighted norm inequalities. *Chapter 8* discusses Littlewood-Paley theory, which had developments that resulted in a number of applications. The *final chapter* concludes with an important result, the T1 theorem, which has been of crucial importance in the field.

This volume has been updated and translated from the Spanish edition that was published in 1995. Minor changes have been made to the core of the book; however, the sections, "Notes and Further Results" have been considerably expanded and incorporate new topics, results, and references. *It is geared toward graduate students seeking a concise introduction to the main aspects of the classical theory of singular operators and multipliers.* Prerequisites include basic knowledge in Lebesgue integrals and functional analysis.

Contents: Fourier series and integrals ◆ The Hardy-Littlewood maximal function ◆ The Hilbert transform ◆ Singular integrals (I) ◆ Singular integrals (II) ◆ H1 and BMO ◆ Weighted inequalities ◆ Littlewood-Paley theory and multipliers ◆ The T1 theorem ◆ *Bibliography* ◆ *Index*

2013	**240 pp**	**Paperback**
978-1-4704-0926-5		**₹ 1,320.00**

Fourier Analysis and Its Applications

AMS

Gerald B Folland
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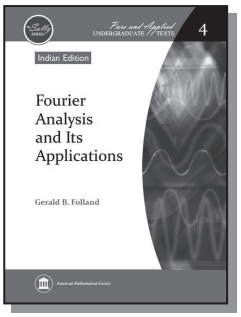

This book presents the theory and applications of Fourier series and integrals, eigenfunction expansions, and related topics, on a level suitable for advanced undergraduates. It includes material on Bessel functions, orthogonal polynomials, and Laplace transforms, and it concludes with chapters on generalized functions and Green"s functions for ordinary and partial differential equations. *The book deals almost exclusively with aspects of these subjects that are useful in physics and engineering, and includes a wide variety of applications.* On the theoretical side, it uses ideas from modern analysis

to develop the concepts and reasoning behind the techniques without getting bogged down in the technicalities of rigorous proofs.

Contents: Overture ⋄ Fourier Series ⋄ Orthogonal Sets of Functions ⋄ Some Boundary Value Problems ⋄ Bessel Functions ⋄ Orthogonal Polynomials ⋄ The Fourier Transform ⋄ The Laplace Transform ⋄ Generalized Functions ⋄ Green's Functions ⋄ *Appendices* ⋄ *Answers to the Exercises* ⋄ *References* ⋄ *Index of Symbols* ⋄ *Index*

2010	448 pp	Paperback
978-0-8218-5208-8		₹ 1,645.00

Higher Order Fourier Analysis

AMS

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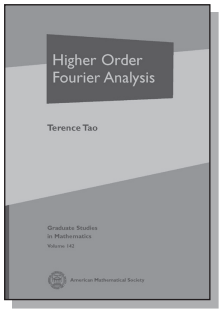


Traditional Fourier analysis, which has been remarkably effective in many contexts, uses linear phase functions to study functions. Some questions, such as problems involving arithmetic progressions, naturally lead to the use of quadratic or higher order phases. Higher order Fourier analysis is a subject that has become very active only recently. Gowers, in groundbreaking work, developed many of the basic concepts of this theory in order to give a new, quantitative proof of Szemerédi's theorem on arithmetic progressions. However, there are also precursors to this theory in Weyl's classical theory of equidistribution, as well as in Furstenberg's structural theory of dynamical systems. The book serves as an introduction to the field, giving the beginning graduate student in the subject a high-level overview of the field. The text focuses on the simplest illustrative examples of key results, serving as a companion to the existing literature on the subject. There are numerous exercises with which to test one's knowledge.

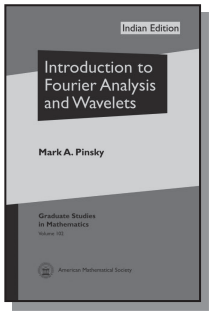
Contents: *Preface* ⋄ *Acknowledgments* ⋄ Chapter 1. Higher order Fourier analysis ⋄ Equidistribution of polynomial sequences in tori ⋄ Roth's theorem ⋄ Linear patterns ⋄ Equidistribution of polynomials over finite fields ⋄ The inverse conjecture for the Gowers norm I. The finite field case ⋄ The inverse conjecture for the Gowers norm II. The integer case ⋄ Linear equations in primes ⋄ Chapter 2. Related articles ⋄ Ultralimit analysis and quantitative algebraic geometry ⋄ Higher order Hilbert spaces ⋄ The uncertainty principle ⋄ *Bibliography* ⋄ *Index*

2016	200 pp	Paperback
978-1-4704-2588-3		₹ 1,320.00

Introduction to Fourier Analysis and Wavelets

AMS

Mark A Pinsky
Northwestern University, Evanston, USA



This book provides a concrete introduction to a number of topics in harmonic analysis, accessible at the early graduate level or, in some cases, at an upper undergraduate level. Necessary prerequisites to using the text are rudiments of the Lebesgue measure and integration on the real line. *It begins* with a thorough treatment of Fourier series on the circle and their applications to approximation theory, probability, and plane geometry (the isoperimetric theorem). Frequently, more than one proof is offered for a given theorem to illustrate the multiplicity of approaches.

The second chapter treats the Fourier transform on Euclidean spaces, especially the author's results in the three-dimensional piecewise smooth case, which is distinct from the classical Gibbs-Wilbraham phenomenon of one-dimensional Fourier analysis. The Poisson summation formula treated in *Chapter 3* provides an elegant connection between Fourier series on the circle and Fourier transforms on the real

line, culminating in Landau's asymptotic formulas for lattice points on a large sphere.

Much of modern harmonic analysis is concerned with the behavior of various linear operators on the Lebesgue spaces $L^p(R^n)$. *Chapter 4* gives a gentle introduction to these results, using the Riesz-Thorin theorem and the Marcinkiewicz interpolation formula. One of the long-time users of Fourier analysis is probability theory. In *Chapter 5* the central limit theorem, iterated log theorem, and Berry-Esseen theorems are developed using the suitable Fourier-analytic tools.

The *final chapter* furnishes a gentle introduction to wavelet theory, depending only on the L_2 theory of the Fourier transform (the Plancherel theorem). The basic notions of scale and location parameters demonstrate the flexibility of the wavelet approach to harmonic analysis.

The text contains numerous examples and more than 200 exercises, each located in close proximity to the related theoretical material.

Contents: Fourier series on the circle ◆ Fourier transforms on the line and space ◆ Fourier analysis in Lp spaces ◆ Poisson summation formula and multiple Fourier series ◆ Applications to probability theory ◆ Introduction to wavelets ◆ *References* ◆ *Notations* ◆ *Index*

2012	**400 pp**	**Paperback**
978-0-8218-8712-7		**₹ 1,600.00**

Functional Analysis

Course in Operator Theory, A

AMS

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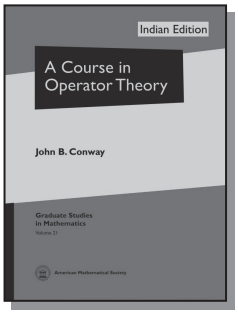

Operator theory is a significant part of many important areas of modern mathematics: functional analysis, differential equations, index theory, representation theory, mathematical physics, and more. *This text covers the central themes of operator theory, presented with the excellent clarity and style that readers have come to associate with Conway's writing.*

Early chapters introduce and review material on C*-algebras, normal operators, compact operators and non-normal operators. The topics include the spectral theorem, the functional calculus and the Fredholm index. Also, some deep connections between operator theory and analytic functions are presented.

Later chapters cover more advanced topics, such as representations of C*-algebras, compact perturbations and von Neumann algebras. Major results, such as the Sz.-Nagy Dilation Theorem, the Weyl–von Neumann–Berg Theorem and the classification of von Neumann algebras, are covered, as is a treatment of Fredholm theory. These advanced topics are at the heart of current research.

The last chapter gives an introduction to reflexive subspaces, i.e., subspaces of operators that are determined by their invariant subspaces. These, along with hyper-reflexive spaces, are one of the more successful episodes in the modern study of asymmetric algebras.

Professor Conway's authoritative treatment makes this a compelling and rigorous course text, suitable for graduate students who have had a standard course in functional analysis.

Contents: Introduction to C*-algebras ◆ Normal operators ◆ Compact operators ◆ Some non-normal operators ◆ More on C*-algebras ◆ Compact perturbations ◆ Introduction to von Neumann algebras ◆ Reflexivity ◆ *Bibliography* ◆ *Index* ◆ *List of symbols*

2013	**392 pp**	**Paperback**
978-1-4704-0925-8		**₹ 1,600.00**

From Vector Spaces to Function Spaces: Introduction to Functional Analysis with Applications

AMS

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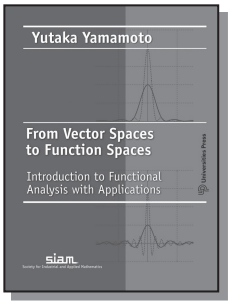


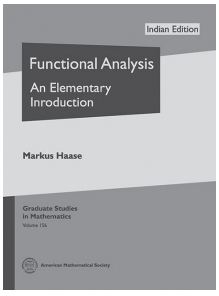
This book provides a treatment of analytical methods of applied mathematics. It starts with a review of the basics of vector spaces and brings the reader to an advanced discussion of applied mathematics, including the latest applications to systems and control theory. The text is designed to be accessible to those not familiar with the material and useful to working scientists, engineers, and mathematics students. The author provides the motivations of definitions and the ideas underlying proofs but does not sacrifice mathematical rigor.

2017	284 pp	Paperback
978-93-86235-34-3		₹ 900.00

Functional Analysis—An Elementary Introduction

AMS PRINT ON DEMAND

Markus Haase
Delft University of Technology, Delft, The Netherlands



This book introduces functional analysis at an elementary level without assuming any background in real analysis, for example on metric spaces or Lebesgue integration. It focuses on concepts and methods relevant in applied contexts such as variational methods on Hilbert spaces, Neumann series, eigenvalue expansions for compact self-adjoint operators, weak differentiation and Sobolev spaces on intervals, and model applications to differential and integral equations. Beyond that, the final chapters on the uniform boundedness theorem, the open mapping theorem and the Hahn–Banach theorem provide a stepping-stone to more advanced texts.

The exposition is clear and rigorous, featuring full and detailed proofs. Many examples illustrate the new notions and results. Each chapter concludes with a large collection of exercises, some of which are referred to in the margin of the text, tailor-made in order to guide the student digesting the new material. Optional sections and chapters supplement the mandatory parts and allow for modular teaching spanning from basic to honors track level.

Contents: *Preface* ◆ Inner product spaces ◆ Normed spaces ◆ Distance and approximation ◆ Continuity and compactness ◆ Banach spaces ◆ The contraction principle ◆ The Lebesgue spaces ◆ Hilbert space fundamentals ◆ Approximation theory and Fourier analysis ◆ Sobolev spaces and the Poisson problem ◆ Operator theory I ◆ Operator theory II ◆ Spectral theory of compact self-adjoint operators ◆ Applications of the spectral theorem ◆ Baire's theorem and its consequences ◆ Duality and the Hahn-Banach theorem ◆ *Historical remarks* ◆ *Appendix A. Background* ◆ *Appendix B. The completion of a metric space* ◆ *Appendix C. Bernstein's proof of Weierstrass' theorem* ◆ *Appendix D. Smooth cutoff functions* ◆ *Appendix E. Some topics from Fourier analysis* ◆ *Appendix F. General orthonormal systems* ◆ *Bibliography* ◆ *Index*

2020	392	Paperback
978-14-7045-473-9		₹ 1,410

Functional Analysis: An Introduction

AMS

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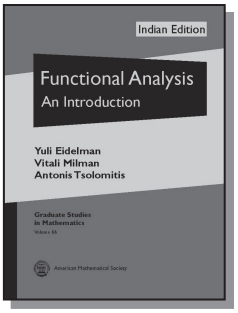

This textbook provides an introduction to the methods and language of functional analysis, including Hilbert spaces, Fredholm theory for compact operators, and spectral theory of self-adjoint operators. It also presents the basic theorems and methods of abstract functional analysis and a few applications of these methods to Banach algebras and the theory of unbounded self-adjoint operators. *The text corresponds to material for two semester courses (Part I and Part II, respectively) and is essentially self-contained.* Prerequisites for the first part are minimal amounts of linear algebra and calculus. For the second part, some knowledge of topology and measure theory is recommended. *Each of the 11 chapters is followed by numerous exercises, with solutions given at the end of the book. The text is ideal for a one-year course. It will also provide a sound basis for further study. It is suitable for graduate students and researchers interested in operator theory and functional analysis.*

Contents: Hilbert spaces and basic operator theory: Linear spaces ◆ Normed spaces ◆ First examples ◆ Hilbert spaces ◆ The dual space ◆ Bounded linear operators ◆ Spectrum ◆ Fredholm theory of compact operators ◆ Self-adjoint operators ◆ Functions of operators ◆ Spectral decomposition ◆ Basics of functional analysis—Spectral theory of unitary operators ◆ The fundamental theorems and the basic methods ◆ Banach algebras ◆ Unbounded self-adjoint and symmetric operators in H ◆ *Solutions to exercises* ◆ *Bibliography* ◆ *Symbols index* ◆ *Subject index*

2011	**344 pp**	**Paperback**
978-0-8218-6879-9		**₹1,590.00**

Lecture Notes on Functional Analysis: With Applications to Linear Partial Differential Equations

AMS

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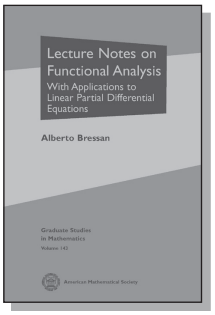


This textbook is addressed to graduate students in mathematics or other disciplines who wish to understand the essential concepts of functional analysis and their applications to partial differential equations. The book is intentionally concise, presenting all the fundamental concepts and results but omitting the more specialized topics. Enough of the theory of Sobolev spaces and semigroups of linear operators is included as needed to develop significant applications to elliptic, parabolic, and hyperbolic PDEs. Throughout the book, care has been taken to explain the connections between theorems in functional analysis and familiar results of finite-dimensional linear algebra. The main concepts and ideas used in the proofs are illustrated with a large number of figures. A rich collection of homework problems is included at the end of most chapters. The book is suitable as a text for a one-semester graduate course.

Contents: *Preface* ◆ Chapter 1. Introduction ◆ Linear equations ◆ Evolution equations ◆ Function spaces ◆ Compactness 7 ◆ Chapter 2. Banach Spaces ◆ Basic definitions ◆ Linear operators ◆ Finite-dimensional spaces ◆ Seminorms and Frechet spaces ◆ Extension theorems ◆ Separation of convex sets

◆ Dual spaces and weak convergence ◆ Problems ◆ Chapter 3. Spaces of Continuous Functions ◆ Bounded continuous functions ◆ The Stone-Weierstrass approximation theorem ◆ Ascoli's compactness theorem ◆ Spaces of Holder continuous functions ◆ Problems ◆ Chapter 4. Bounded Linear Operators ◆ The uniform boundedness principle ◆ The open mapping theorem ◆ The closed graph theorem ◆ Adjoint operators ◆ Compact operators ◆ Problems ◆ Chapter 5. Hilbert Spaces ◆ Spaces with an inner product ◆ Orthogonal projections ◆ Linear functionals on a Hilbert space ◆ Gram-Schmidt orthogonalization ◆ Orthonormal sets ◆ Positive definite operators ◆ Weak convergence ◆ Problems ◆ Chapter 6. Compact Operators on a Hilbert Space ◆ Fredholm theory ◆ Spectrum of a compact operator ◆ Selfadjoint operators ◆ Problems ◆ Chapter 7. Semigroups of Linear Operators ◆ Ordinary differential equations in a Banach space ◆ Semigroups of linear operators ◆ Resolvents ◆ Generation of a semigroup ◆ Problems ◆ Chapter 8. Sobolev Spaces ◆ Distributions and weak derivatives ◆ Mollifications ◆ Sobolev spaces ◆ Approximations of Sobolev functions ◆ Extension operators ◆ Embedding theorems ◆ Compact embeddings ◆ Differentiability properties ◆ Problems ◆ Chapter 9. Linear Partial Differential Equations ◆ Elliptic equations ◆ Parabolic equations ◆ Hyperbolic equations ◆ Problems ◆ *Appendix. Background Material* ◆ *A.1. Partially ordered sets* ◆ *A.2. Metric and topological spaces* ◆ *A.3. Review of Lebesgue measure theory* ◆ *A.4. Integrals of functions taking values in a Banach space* ◆ *A.5. Mollifications* ◆ *A.6. Inequalities* ◆ *A.7. Problems* ◆ *Summary of Notation* ◆ *Bibliography* ◆ *Index*

2016	264 pp	Paperback
978–1–4704–2589–0		₹ 1,395.00

Principles of Functional Analysis (Second Edition)

AMS

Martin Schechter
University of California, Irvine, USA

Functional analysis plays a crucial role in the applied sciences as well as in mathematics. It is a beautiful subject that can be motivated and studied for its own sake. *In keeping with this basic philosophy, the author has made this introductory text accessible to a wide spectrum of students, including beginning-level graduates and advanced undergraduates.* The exposition is inviting, following threads of ideas, describing each as fully as possible, before moving on to a new topic. *Supporting material* is introduced as appropriate, and only to the degree needed. Some topics are treated more than once, according to the different contexts in which they arise. The prerequisites are minimal, requiring little more than advanced calculus and no measure theory. The text focusses on normed vector spaces and their important examples, Banach spaces and Hilbert spaces. The author also includes topics not usually found in texts on the subject. This *Second Edition* incorporates many new developments while not overshadowing the book's original flavour. Areas in the book that demonstrate its unique character have been strengthened. In particular, new material concerning Fredholm and semi-Fredholm operators is introduced, requiring minimal effort as the necessary machinery was already in place. Several new topics are presented, but relate to only those concepts and methods emanating from other parts of the book. These topics include perturbation classes, measures of noncompactness, strictly singular operators, and operator constants. *Overall, the presentation has been refined, clarified, and simplified, and many new problems have been added.*

Contents: Basic notions ◆ Duality ◆ Linear operators ◆ The Riesz theory for compact operators ◆ Fredholm operators ◆ Spectral theory ◆ Unbounded operators ◆ Reflexive Banach spaces ◆ Banach algebras ◆ Semigroups ◆ Hilbert space ◆ Bilinear forms ◆ Selfadjoint operators ◆ Measures of operators ◆ Examples and applications ◆ *Glossary* ◆ *Major Theorems* ◆ *Bibliography* ◆ *Index*

2009	448 pp	Paperback
978–0–8218–4856–2		₹ 1,330.00

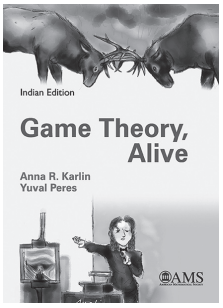
Game Theory

Game Theory, Alive

AMS PRINT ON DEMAND

Anna R Karlin
University of Washington, Seattle, WA

Yuval Peres
Microsoft Research, Redmond, WA



This book presents a rigorous introduction to the mathematics of game theory without losing sight of the joy of the subject. This is done by focusing on theoretical highlights (e.g., at least six Nobel Prize winning results are developed from scratch) and by presenting exciting connections of game theory to other fields, such as computer science, economics, social choice, biology, and learning theory. Both classical topics, such as zero-sum games, and modern topics, such as sponsored search auctions, are covered. Along the way, beautiful mathematical tools used in game theory are introduced, including convexity, fixed-point theorems, and probabilistic arguments.

The book is appropriate for a first course in game theory, either at the undergraduate or graduate level, whether in mathematics, economics, computer science, or statistics.

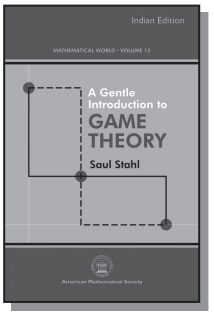
Contents: *Preface* ◆ *An overview of the book* ◆ *Part I: Analyzing games: Strategies and equilibria* ◆ *Part II: Designing games and mechanisms* ◆ *For the reader and instructor* ◆ *Prerequisites* ◆ *Courses* ◆ *Notes* ◆ **Part I:** Analyzing games: Strategies and equilibria ◆ Combinatorial games ◆ Two-person zero-sum games ◆ Zero-sum games on graphs ◆ General-sum games ◆ Existence of Nash equilibria and fixed points ◆ Games in extensive form ◆ Evolutionary and correlated equilibria ◆ The price of anarchy ◆ Random-turn games ◆ **Part II:** Designing games and mechanisms ◆ Stable matching and allocation ◆ Fair division ◆ Cooperative games ◆ Social choice and voting ◆ Auctions ◆ Truthful auctions in win/lose settings ◆ VCG and scoring rules ◆ Matching markets ◆ Adaptive decision making ◆ *Appendix A. Linear programming* ◆ *Appendix B. Some useful probability tools* ◆ *Appendix C. Convex functions* ◆ *Appendix D. Solution sketches for selected exercises* ◆ *Bibliography* ◆ *Index*

2020 400 pp Paperback
978-14-7045-478-4 Rs 1410

Gentle Introduction to Game Theory, A

AMS

Saul Stahl
University of Kansas, Lawrence, USA



The mathematical theory of games was first developed as a model for situations of conflict, whether actual or recreational. It gained widespread recognition when it was applied to the theoretical study of economics by von Neumann and Morgenstern in Theory of Games and Economic Behavior in the 1940s. The later bestowal in 1994 of the Nobel Prize in economics on Nash underscores the important role this theory has played in the intellectual life of the twentieth century. This volume is based on courses given by the author at the University of Kansas. The exposition is "gentle" because it requires only some knowledge of coordinate geometry; linear programming is not used. It is "mathematical" because it is more concerned with the mathematical solution of games than with their applications. Existing textbooks on the topic tend to focus either on the applications or on the mathematics at a level that makes the works inaccessible to most non-mathematicians. This

book nicely fits in between these two alternatives. It discusses examples and completely solves them with tools that require no more than high school algebra. In this text, proofs are provided for both von Neumann's Minimax Theorem and the existence of the Nash Equilibrium in the 2 × 2 case. Readers will gain both a sense of the range of applications and a better understanding of the theoretical framework of these two deep mathematical concepts.

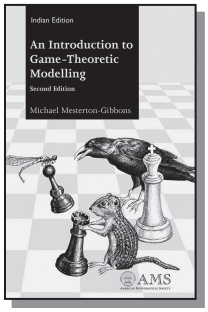
Contents: Introduction ◆ The formal definitions ◆ Optimal responses to specific strategies ◆ The maximin strategy ◆ The minimax strategy ◆ Solutions of zero-sum games ◆ 2 × n and m × 2 games ◆ Dominance ◆ Symmetric games ◆ Poker-like games ◆ Pure maximin and minimax strategies ◆ Pure nonzero-sum games ◆ Mixed strategies for nonzero-sum games ◆ Finding mixed Nash equilibria for 2 × 2 nonzero-sum games ◆ *Bibliography* ◆ *Solutions to selected exercises* ◆ *Index*

2012	**188 pp**	**Paperback**
978–0–8218–9182–7		**₹1,320.00**

Introduction to Game–Theoretic Modelling, An
(Second Edition)

AMS

Michael Mesterton–Gibbons
Florida State University, Tallahassee, USA



This book is about using game theory in mathematical modelling. It is an introductory text, covering the basic ideas and methods of game theory as well as the necessary ideas from the vast spectrum of scientific study where the methods are applied. It has by now become generally apparent that game theory is a fascinating branch of mathematics with both serious and recreational applications.

Strategic behavior arises whenever the outcome of an individual's action depends on actions to be taken by other individuals--whether human, as in the Prisoners' Dilemma, or otherwise, as in the "duels of damselflies". *As a result, game-theoretic mathematical models are applicable in both the social and natural sciences.* In reading this book, you can learn not just about game theory, but also about how to model real situations so that they can be analyzed mathematically.

Mesterton-Gibbons includes the familiar game theory examples where they are needed for explaining the mathematics or when they provide a valuable application. *There are also plenty of new examples, in particular from biology, such as competitions for territory or mates, games among kin versus games between kin, and cooperative wildlife management.* Prerequisites are modest. Students should have some mathematical maturity and a familiarity with basic calculus, matrix algebra, probability, and some differential equations. As Mesterton-Gibbons writes, "The recurring theme is that game theory is fun to learn, doesn't require a large amount of mathematical rigor, and has great potential for application."

This new edition contains a significant amount of updates and new material, particularly on biological games. An important chapter on population games now has virtually all new material. The book is absolutely up-to-date with numerous references to the literature. Each chapter ends with a commentary which surveys current developments.

Contents: Noncooperative games ◆ Evolutionary stability and other selection criteria ◆ Cooperative games in strategic form ◆ Characteristic function games ◆ Cooperation and the prisoner's dilemma ◆ More population games ◆ Appraisal ◆ The tracing procedure ◆ *Solutions to selected exercises* ◆ *Bibliography* ◆ *Index*

2012	**392 pp**	**Paperback**
978–0–8218–9186–5		**₹1,600.00**

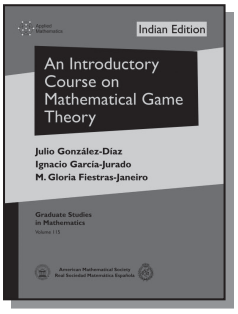
Introductory Course on Mathematical Game Theory, An

AMS

Julio González–Díaz
Universidade de Santiago de Compostela, Spain

Ignacio García–Jurado
Universidad de Coruña, Spain

M Gloria Fiestras–Janeiro
Universidade de Vigo, Spain



Game theory provides a mathematical setting for analyzing competition and cooperation in interactive situations. The theory has been famously applied in economics, but is relevant in many other sciences, such as political science, biology, and, more recently, computer science. This book presents an introductory and up-to-date course on game theory addressed to mathematicians and economists, and to other scientists having a basic mathematical background. The book is self-contained, providing a formal description of the classic game-theoretic concepts together with rigorous proofs of the main results in the field. The theory is illustrated through abundant examples, applications, and exercises.

The style is distinctively concise, while offering motivations and interpretations of the theory to make the book accessible to a wide readership. The basic concepts and results of game theory are given a formal treatment, and the mathematical tools necessary to develop them are carefully presented. Cooperative games are explained in detail, with bargaining and TU-games being treated as part of a general framework. The authors stress the relation between game theory and operations research.

The book is suitable for a graduate or an advanced undergraduate course on game theory.

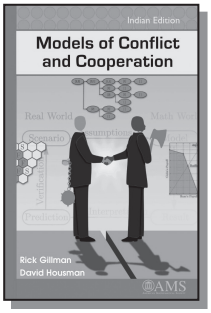
2012	340 pp	Paperback
978–0–8218–9180–3		₹ 1,525.00

Models of Conflict and Co-operation

AMS

Rick Gillman
Valparaiso University, USA

David Housman
Goshen College, USA



Models of Conflict and Cooperation is a comprehensive, introductory, game theory text for general undergraduate students. *As a textbook, it provides a new and distinctive experience for students working to become quantitatively literate.* Each chapter begins with a "dialogue" that models quantitative discourse while previewing the topics presented in the rest of the chapter. Subsequent sections develop the key ideas starting with basic models and ending with deep concepts and results. *Throughout all of the sections, attention is given to promoting student engagement with the material through relevant models, recommended activities, and exercises.* The general game models that are discussed include deterministic, strategic, sequential, bargaining, coalition, and fair division games. A separate, essential chapter discusses player preferences. All of the chapters are designed to strengthen the fundamental mathematical skills of quantitative literacy: logical reasoning, basic algebra and probability skills, geometric reasoning, and problem solving. A distinctive feature of this book is its emphasis on the process of mathematical modeling.

Contents: Deterministic Games ⋄ Player Preferences ⋄ Strategic Games ⋄ Probabilistic Strategies Strategic ⋄ Game Cooperation ⋄ Negotiation and Arbitration ⋄ Coalition Games ⋄ Fair Division ⋄ *Epilogue* ⋄ *Bibliography* ⋄ *Index*

2012	**432 pp**	**Paperback**
978-0-8218-9183-4		**₹ 1,670.00**

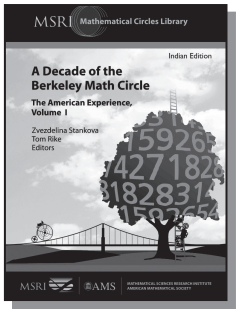
General Mathematics

Decade of the Berkeley Math Circle, A: The American Experience, Volume I

AMS

Zvezdelina Stankova (Ed.)
Mills College, Oakland; University of California, Berkeley, USA

Tom Rike (Ed.)
Oakland High School, USA



Many mathematicians have been drawn to mathematics through their experience with math circles: extracurricular programs exposing teenage students to advanced mathematical topics and a myriad of problem solving techniques and inspiring in them a lifelong love for mathematics. Founded in 1998, the *Berkeley Math Circle (BMC)* is a pioneering model of a U.S. math circle, aspiring to prepare our best young minds for their future roles as mathematics leaders. Over the last decade, 50 instructors--from university professors to high school teachers to business tycoons--have shared their passion for mathematics by delivering more than 320 BMC sessions full of mathematical challenges and wonders.

Based on a dozen of these sessions, *this book encompasses a wide variety of enticing mathematical topics:* from inversion in the plane to circle geometry; from combinatorics to Rubik's cube and abstract algebra; from number theory to mass point theory; from complex numbers to game theory via invariants and monovariants. *The treatments of these subjects encompass every significant method of proof and emphasize ways of thinking and reasoning via 100 problem solving techniques. Also featured are 300 problems, ranging from beginner to intermediate level, with*

occasional peaks of advanced problems and even some open questions.

The book presents possible paths to studying mathematics and inevitably falling in love with it, via teaching two important skills: *thinking creatively while still "obeying the rules,"* and making connections between problems, ideas, and theories. The book encourages you to apply the newly acquired knowledge to problems and guides you along the way, but rarely gives you ready answers. "*Learning from our own mistakes*" often occurs through discussions of non-proofs and common problem solving pitfalls. The reader has to commit to mastering the new theories and techniques by "getting your hands dirty" with the problems, going back and reviewing necessary problem solving techniques and theory, and persistently moving forward in the book. The mathematical world is huge: you'll never know everything, but you'll learn *where* to find things, how to connect and use them. The rewards will be substantial. Titles in this series are co-published with the Mathematical Sciences Research Institute (MSRI).

Contents: Inversion in the plane ◆ Combinatorics. Part I ◆ Rubik's cube ◆ Number theory ◆ A few words about proofs ◆ Mathematical induction ◆ Mass point geometry ◆ More on proofs ◆ Complex numbers ◆ Stomp. Games with invariants ◆ Favorite problems at BMC ◆ Monovariants ◆ *Epilogue* ◆ *Symbols and notation* ◆ *Abbreviations* ◆ *Biographical data* ◆ *Bibliography* ◆ *Credits* ◆ *Index*

2012	**344 pp**	**Paperback**
978–0–8218–8728–8		**₹ 1,170.00**

Famous Puzzles of Great Mathematicians

AMS

Miodrag S Petkovi
University of Nis, Serbia

This entertaining book presents a collection of 180 famous mathematical puzzles and intriguing elementary problems that great mathematicians have posed, discussed, and/or solved. The selected problems do not require advanced mathematics, making this book accessible to a variety of readers.

Mathematical recreations offer a rich playground for both amateur and professional mathematicians. Believing that creative stimuli and aesthetic considerations are closely related, great mathematicians from ancient times to the present have always taken an interest in puzzles and diversions. The goal of this book is to show that famous mathematicians have all communicated brilliant ideas, methodological approaches, and absolute genius in mathematical thoughts by using recreational mathematics as a framework. Concise biographies of many mathematicians mentioned in the text are also included.

The majority of the mathematical problems presented in this book originated in number theory, graph theory, optimization, and probability. Others are based on combinatorial and chess problems, while still others are geometrical and arithmetical puzzles.

This book is intended to be both entertaining as well as an introduction to various intriguing mathematical topics and ideas. *Certainly, many stories and famous puzzles can be very useful to prepare classroom lectures, to inspire and amuse students, and to instill affection for mathematics.*

Contents: Recreational mathematics ◆ Arithmetic ◆ Number theory ◆ Geometry Tiling and packing ◆ Physics Combinatorics ◆ Probability Graphs ◆ Chess ◆ Miscellany ◆ *Appendices A-D* ◆ *Biographies* ◆ *Bibliography* ◆ *Name index*

2012	**304 pp**	**Paperback**
978–0–8218–8727–1		**₹ 1,525.00**

Fun and Fundamentals of Mathematics

PRINT ON DEMAND

Jayanth V Narlikar & Mangala Narlikar

This book introduces fundamental ideas in mathematics through interesting puzzles. Students, from age 12 upwards, who are bored with routine classwork in maths will enjoy these puzzles which will sharpen their logical reasoning. *It is designed to arouse an interest in mathematics among readers in the 12–18 age group.*

2001	**200 pp**	**Paperback**
978–81–7371–398–9		**₹ 650.00**

Math Problems Notebook, The

Valentin Boju & Louis Funar

The Math Problems Notebook is a collection of nontrivial, unconventional problems requiring

deep insight and imagination reminiscent of those discussed at Sunday Math Circles. These circles have become a place for disseminating beautiful mathematics at an elementary level for college students who have a common passion for mathematics.

The problems cover many topics, including number theory, algebra, combinatorics, geometry and analysis, of varying levels of difficulty. The presentation of each topic begins with simple exercises and follows with more difficult problems, challenging enough even for the experienced problem solver. The easier problems focus on basic methods and tools, while the *more advanced problems develop problem-solving techniques, intuition and promote further research.*

2010	248 pp	Paperback
978-81-8489-527-8		₹ 700.00

Mathematical Omnibus: Thirty Lectures on Classic Mathematics

AMS

Dmitry Fuchs
University of California, Davis, USA

Serge Tabachnikov
Pennsylvania State University, University Park, USA

The book consists of thirty lectures on diverse topics, covering much of the mathematical landscape rather than focusing on one area. The reader will learn numerous results that often belong to neither the standard undergraduate nor graduate curriculum and will discover connections between classical and contemporary ideas in algebra, combinatorics, geometry, and topology. The reader's effort will be rewarded in seeing the harmony of each subject. The common thread in the selected subjects is their illustration of the unity and beauty of mathematics. *Most lectures contain exercises, and solutions or answers are given to selected exercises. A special feature of the book is an abundance of drawings (more than four hundred), artwork by an award-winning artist, and about a hundred portraits of mathematicians.* Almost every lecture contains surprises for even the seasoned researcher.

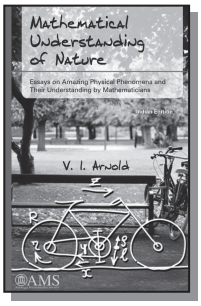
Contents: Arithmetic and Combinatorics ◆ Equations ◆ Envelopes and Singularities ◆ Developable Surfaces ◆ Straight Lines ◆ Polyhedra ◆ Two Surprising Topological Constructions ◆ *On Ellipses and Ellipsoids* ◆ *Bibliography* ◆ *Index*

2011	480 pp	Paperback
978-0-8218-6885-0		₹ 1,845.00

Mathematical Understanding of Nature

AMS

V I Arnold



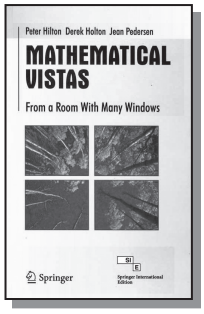
This collection of 39 short stories gives the reader a unique opportunity to take a look at the scientific philosophy of Vladimir Arnold, one of the most original contemporary researchers.

Topics of the stories range from astronomy, to mirages, to motion of glaciers, to geometry of mirrors and beyond. In each case Arnold's explanation is both deep and simple, which makes the book interesting and accessible to an extremely broad readership. Original illustrations hand drawn by the author help the reader to further understand and appreciate Arnold's view on the relationship between mathematics and science.

2017	184 pp	Paperback
978-1-4704-3838-8		₹ 1,385.00

Mathematical Vistas: From a Room with Many Windows

Peter Hilton, Derek Holton & Jean Pedersen



The goal of Mathematical Vistas is to stimulate the interest of bright people in mathematics. The book consists of nine related mathematical essays which will intrigue and inform the curious reader. In order to offer a broad spectrum of exciting developments in mathematics, topics are treated at different levels of depth and thoroughness. Some chapters can be understood completely with little background, others can be thought of as appetisers for further study. A number of breaks are included in each chapter. These are problems designed to test the reader's understanding of the material thus far in the chapter.

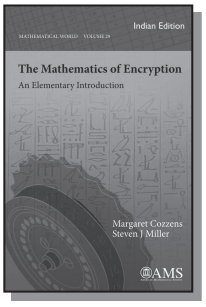
2010	352 pp	Paperback
978-81-8489-523-0		₹ 1,045.00

Mathematics of Encryption, The

AMS

Margaret Cozzens
DIMACS, Rutgers University, Piscataway, NJ

Steven J Miller
Williams College, Williamstown, MA



How quickly can you compute the remainder when dividing 109837 by 120143? Why would you even want to compute this? And what does this have to do with cryptography? Modern cryptography lies at the intersection of mathematics and computer science, involving number theory, algebra, computational complexity, fast algorithms and even quantum mechanics. Many people think of codes in terms of spies, but in the information age, highly mathematical codes are used every day by almost everyone, whether at the bank ATM, at the grocery checkout, or at the keyboard when you access your email or purchase products online.

This book provides a historical and mathematical tour of cryptography, from classical ciphers to quantum cryptography. The authors introduce just enough mathematics to explore modern encryption methods, with nothing more than basic algebra and some elementary number theory being necessary. Complete expositions are given of the classical ciphers and the attacks on them, along with a detailed description of the famous Enigma system. The public-key system RSA is described, including a complete mathematical proof that it works. Numerous related topics are covered, such as efficiencies of algorithms, detecting and correcting errors, primality testing and digital signatures. The topics and exposition are carefully chosen to highlight mathematical thinking and problem solving.

Each chapter ends with a collection of exercises, ranging from straightforward applications to more challenging exercises that introduce advanced topics. Unlike many books in the field, this book is aimed at a general liberal arts student, but without losing mathematical completeness.

2017	352 pp	Paperback
978-1-4704-3733-6		₹ 1,770.00

Primer on Logarithms, A

PRINT ON DEMAND

Shailesh Shirali

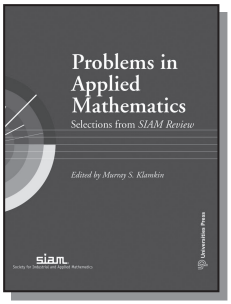
The book describes how logarithms are used in scales of measurement: for intensity of sound (decibel scale), intensity of earthquakes (Richter scale), level of acidity of a solvent (pH level), brightness of stars (absolute and apparent magnitude), ...The key properties of the log function are presented, those that make it so attractive and so indispensable in science-for describing population growth, radioactivity, cooling, etc. This book will be particularly useful to students who wish to appear for the Mathematical Olympiads. The presentation is enhanced with snippets and illustrated by line drawings.

2002	200	Paperback
978-81-7371-414-6		₹ 495.00

Problems in Applied Mathematics

AMS

Murray S Klamkin
University of Alberta, Edmonton, AB



People in all walks of life – and perhaps mathematicians especially – delight in working on problems for the sheer pleasure of meeting a challenge. The problem section of SIAM Review has always provided such a challenge for mathematicians. The section was started to offer classroom instructors and their students as well as other interested problemists, a set of problems – solved or unsolved – illustrating various applications of mathematics. In many cases the unsolved problems were eventually solved. Problems in Applied Mathematics is a compilation of 380 of SIAM Review's most interesting problems dating back to the journal's inception in 1959. The problems are classified into 22 broad categories including Series, Special Functions, Integrals, Polynomials, Probability, Combinatorics, Matrices and Determinants, Optimization, Inequalities, Ordinary Differential Equations, Boundary Value Problems, Asymptotics and Approximations, Mechanics, Graph Theory and Geometry.

2017	**616 pp**	**Paperback**
978-93-86235-42-8		**₹ 1,500.00**

Understanding Mathematics

K B Sinha, R L Karandikar, C Musili, S Pattanayak, D Singh & A Dey

The book explains the 'hows' and 'whys' and also whets the appetite of a good student for more of good mathematics.

2000	**264 pp**	**Paperback**
978-81-7371-355-2		**₹ 955.00**

Winning Solutions

Edward Lozansky & Cecil Rousseau

This book is intended to provide students with the appropriate mathematical tools and problem-solving experience to successfully compete in high-level problem solving competitions. In each section, the authors attempt to "fill in" the appropriate background and then provide the student with a *variety of worked examples* and exercises to help bridge the gap between what he or she may already know and what is required for high-level competitions. *Answers or sketches of the solutions are given for all exercises*. The book makes an attempt to introduce each area "gently", assuming little in the way of prior background—and teach the appropriate techniques, rather than simply providing a compilation of high-level problems.

2010	**236 pp**	**Paperback**
978-81-8489-526-1		**₹ 925.00**

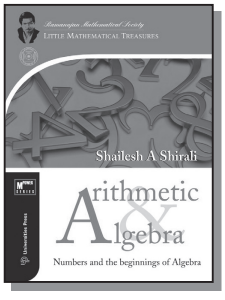
General Mathematics: Little Mathematical Treasures

This series, in association with the *Ramanujan Mathematical Society*, is addressed to mathematically mature readers and students in their last two years of school education. The books in this series will contain expository material not generally included in standard school or college texts.

The titles in this series are authored by Shailesh A Shirali, Principal, Sahyadri School KFI Tiwai Hill, Gundalwadi Rajgurunagar Taluka, Pune, India.

Arithmetic and Algebra: Numbers and the Beginnings of Algebra

PRINT ON DEMAND



Arithmetic and Algebra: Numbers and the beginnings of Algebra is written for students of mathematics in classes 7 to 10. It can be used by middle school and high school mathematics teachers who wish to take their students to a deeper level of the subject; it can also be studied by those who have a general interest in the subject. With the help of revealing examples and exercises, the book aims to help students journey into a world of pattern, power and beauty—a journey which can enrich their life greatly.

This is the first book in the MPOWER series of books on arithmetic, algebra and geometry and is included in the Ramanujan Mathematical Series: Little Mathematical Treasures.

Contents: The World of Numbers: The unending supply of numbers ◆ Roman numerals ◆ Hindu–Arabic numerals ◆ Positive and negative ◆ Addition and subtraction ◆ Multiplication and division ◆ Number patterns ◆ Palindromic entertainment ◆ Miscellaneous problems I ◆ Miscellaneous problems II ◆ Miscellaneous problems III ◆ Beginnings of Algebra: Framing sentences ◆ Expressing patterns ◆ Laws of algebra ◆ Using algebra to explain patterns ◆ Using algebra to discover properties ◆ Factorisation ◆ Equations Closing quotes ◆ Families of Integers: Odd and even ◆ Multiples of ◆ 3 Multiples of 5 ◆ Prime and composite ◆ GCD and LCM ◆ Euclid's algorithm ◆ Perfect numbers ◆ Squares and cubes ◆ Triangular numbers ◆ Powers of 2 ◆ Miscellaneous problems ◆ Fractions, Decimals and Percentages: Fractions as numbers ◆ Equivalent fractions ◆ Arithmetic with fractions ◆ Decimal fractions ◆ Percentages ◆ Fractions on the number line ◆ Rational numbers ◆ Miscellaneous exercises ◆ Fractions: Special Topics: Recurring decimals ◆ Powers of integers—on a clothes line! ◆ Cyclic numbers ◆ Decimal expansion of 1/p ◆ Irrational numbers ◆ Unit fractions ◆ Mischievous fractions Farey sequences ◆ Miscellaneous exercises ◆ Ratio and Proportion: Ratios for unit conversion ◆ Rate ◆ Dimensionless ratios ◆ Proportion ◆ Results concerning proportion ◆ Continued proportion ◆ Historical note ◆ Approximations to pi ◆ The tangram puzzle ◆ Indices and Exponents: Introduction ◆ The laws of indices ◆ Big numbers ◆ The four twos ◆ Visualising big numbers ◆ Negative exponents ◆ Fractional exponents ◆ Growth patterns ◆ Exponential notation in science ◆ Three diversions ◆ Polynomials: Notion of a polynomial ◆ Degree of the zero polynomial ◆ Alternate definition ◆ Multiplication ◆ Division ◆ GCD ◆ Roots of a polynomial ◆ The remainder theorem ◆ Symmetric polynomials ◆ Expansions in Algebra: Homogeneous expressions ◆ Expansions using shortcuts ◆ Binomial expansions I ◆ Using the Pascal triangle ◆ Binomial expansions II ◆ Squares of multinomials ◆ Sum and product formulas ◆ Difference of two squares ◆ Visual representations ◆ Miscellaneous expansions ◆ A claim of Ramanujan's ◆ Factorisation of Polynomials: Difference of two squares ◆ Application to integer factorisation ◆ Factorisation by breaking up an expression ◆ Factorisation of quadratic trinomials ◆ A more complex example ◆ Using the factor theorem ◆ A square investigation ◆ Linear Equations: Introduction to equations ◆ Genesis of equations ◆ Solution sets ◆ Solving an equation ◆ Linear equations in two unknowns ◆ Application I: Clock problems ◆ Application II: Pythagorean triples ◆ Application III: Squares in AP ◆ Application IV: Unit fractions ◆ Problem Corner: Appetisers ◆ For the junior mathlete ◆ Investigations: Mischievous cancellations ◆ Mischievous square roots ◆ Prime numbers ◆ Digital sums ◆ Digital reversals ◆ Squares and 2006 . . . ◆ Squares and cubes ◆ Still more squares ◆ And yet more squares . . . ◆ Accommodating numbers ◆ *Answers* ◆ *Exercises* ◆ *Index*

2012	360 pp	Paperback
978–81–7371–767–3		₹ 1,075.00

Arithmetic and Algebra: The Challenge and Thrill

PRINT ON DEMAND

The two-volume set on Arithmetic and Algebra, of which this book forms the second part, aims to help middle school and high school students journey into a world of pattern, power and beauty revealed through mathematics. In the first book titled *Arithmetic and Algebra: Numbers and the Beginnings of Algebra*, algebra was introduced with the help of the number system. With this base, wonderful and interesting facts about numbers were uncovered and proved. Continuing this study in topics ranging from basic number theory to understanding data through pictorial means—a vitally important but generally ignored topic—to a study of triangular numbers, the visual and the symbolic are combined in a beautiful blend to enrich learners' lives with new perceptions on mathematics. This book can be used by teachers who wish to take their students to a deeper level of the subject as well as by those who have a general interest in the subject.

This book, under the MPOWER series of books on arithmetic, algebra and geometry, is a part of the Little Mathematical Treasures series of the Ramanujan Mathematical Society containing expository material not generally included in standard school or college texts.

Available in e-book format only.
For details, visit www.universitiespress.com.

General Mathematics: Mathematical Marvels

This exciting series brings the beauty and captivation of mathematics to the undergraduate, to the mathematics teacher, to the scientist or engineer, and to the lay reader with a strong interest in mathematics. It features well-written, challenging expository works that capture the fascination and usefulness of mathematics.

The titles in this series are authored by Shailesh A Shirali, Principal, Sahyadri School KFI Tiwai Hill, Gundalwadi Rajgurunagar Taluka, Pune, India.

Adventures in Problem Solving

This book deals with an important area in mathematics—Problem Solving—making it an exciting adventure. Having been associated with the Mathematical Olympiad programme since its inception in India, the author has drawn a lot on this experience in terms of material as well as in terms of the lucid style of writing. In this book, which is addressed to problem buffs, you will find many topics in 'serious' and 'recreational' mathematics developed through problems (surds, logarithms, geometry, inequalities, magic squares, cryptarithms, logic, counting, number theory, games such as Nim). *It will be particularly useful to students who wish to appear for the Mathematical Olympiads.*

2002	**328 pp**	**Paperback**
978–81–7371–413–9		**₹ 1,050.00**

Primer on Number Sequences, A

This book offers an excursion into the world of number sequences, objects that occur widely all through Mathematics. *Part I* deals with the generating formula of a sequence, and *Part II* with individual sequences such as the squares, the cubes, the primes, the unit fractions, the Fibonacci numbers, and so on. *The book is aimed at students and general readers. It will be particularly useful to students who wish to appear for the Mathematical Olympiads.*

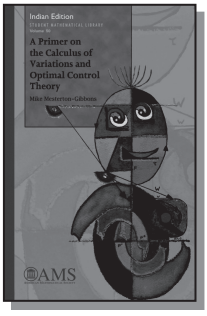
2001	**172 pp**	**Paperback**
978–81–7371–369–9		**₹ 835.00**

General Mathematics: Mathematical Methods

Primer on the Calculus of Variations and Optimal Control Theory, A

AMS

Michael Mesterton–Gibbons
Florida State University, Tallahassee, USA



The calculus of variations is used to find functions that optimize quantities expressed in terms of integrals. Optimal control theory seeks to find functions that minimize cost integrals for systems described by differential equations.

This book is an introduction to both the classical theory of the calculus of variations and the more modern developments of optimal control theory from the perspective of an applied mathematician. It focuses on understanding concepts and how to apply them. The range of potential applications is broad: *the calculus of variations and optimal control theory have been widely used in numerous ways in biology, criminology, economics, engineering, finance, management*

science, and physics. Applications described in this book include cancer chemotherapy, navigational control, and renewable resource harvesting.

The prerequisites for the book are modest: the standard calculus sequence, a first course on ordinary differential equations, and some facility with the use of mathematical software. *It is suitable for an undergraduate or beginning graduate course, or for self study*. It provides excellent preparation for more advanced books and courses on the calculus of variations and optimal control theory.

Contents: The Brachistochrone ◆ The fundamental problem Extremals ◆ The insufficiency of extremality ◆ Important first integrals ◆ The du Bois-Reymond equation ◆ The corner conditions ◆ Legendre's necessary condition ◆ Jacobi's necessary condition ◆ Weak versus strong variations ◆ Weierstrass's necessary condition ◆ The transversality conditions ◆ Hilbert's invariant integral ◆ The fundamental sufficient condition ◆ Jacobi's condition revisited ◆ Isoperimetrical problems ◆ Optimal control problems ◆ Necessary conditions for optimality ◆ Time-optional control ◆ A singular control problem ◆ A biological control problem ◆ Optimal control to a general target ◆ Navigational control problems ◆ State variable restrictions ◆ Optimal harvesting ◆ *Afterword* ◆ *Solutions or hints for selected exercises* ◆ *Bibliography* ◆ *Index*

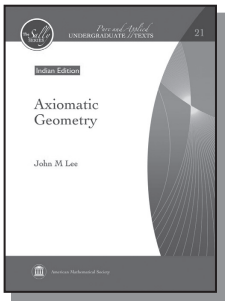
2012	**272 pp**	**Paperback**
978–0–8218–8734–9		**₹ 1,395.00**

Geometry

Axiomatic Geometry

AMS

John M Lee
University of Washington, Seattle, WA



The story of geometry is the story of mathematics itself: Euclidean geometry was the first branch of mathematics to be systematically studied and placed on a firm logical foundation, and it is the prototype for the axiomatic method that lies at the foundation of modern mathematics. It has been taught to students for more than two millennia as a model of logical thought.

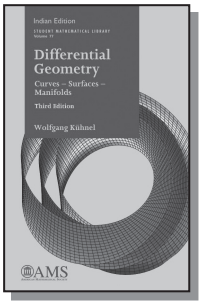
This book tells the story of how the axiomatic method has progressed from Euclid's time to ours, as a way of understanding what mathematics is, how we read and evaluate mathematical arguments and why mathematics has achieved the level of certainty it has. It is designed primarily for advanced undergraduates who plan to teach secondary school geometry, but it should also provide something of interest to anyone who wishes to understand geometry and the axiomatic method better. It introduces a modern, rigorous, axiomatic treatment of Euclidean and (to a lesser extent) non-Euclidean geometries, offering students ample opportunities to practice reading and writing proofs while at the same time developing most of the concrete geometric relationships that secondary teachers will need to know in the classroom.

2017	**488 pp**	**Paperback**
978–1–4704–3719–0		**₹ 1,935.00**

Differential Geometry: Curves – Surfaces – Manifolds
(Third Edition)

AMS

Wolfgang Kühnel
University of Stuttgart, Stuttgart, Germany



This carefully written book is an introduction to the beautiful ideas and results of differential geometry. The first half covers the geometry of curves and surfaces, which provides much of the motivation

and intuition for the general theory. The second part studies the geometry of general manifolds, with particular emphasis on connections and curvature. The text is illustrated with many figures and examples. The prerequisites are undergraduate analysis and linear algebra. This new edition provides many advances, including more figures and exercises, and – as a new feature – a good number of solutions to selected exercises.

2017	**416 pp**	**Paperback**
978-1-4704-3740-4		**₹ 1,545.00**

Differential Topology

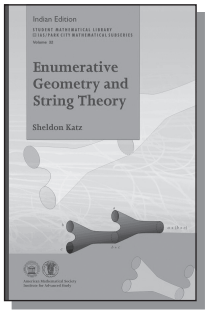
Victor Guillemin, Alan Pollack

See page 142

Enumerative Geometry and String Theory

AMS

Sheldon Katz
University of Illinois at Urbana-Champaign, USA



This book provides a conceptual introduction to the theory of ordinary differential equations, concentrating on the initial value problem for equations of evolution and with applications to the calculus of variations and classical mechanics, along with a discussion of chaos theory and ecological models. It has a unified and visual introduction to the theory of numerical methods and a novel approach to the analysis of errors and stability of various numerical solution algorithms based on carefully chosen model problems. *While the book would be suitable as a textbook for an undergraduate or elementary graduate course in ordinary differential equations, the authors have designed the text also to be useful for motivated students wishing to learn the material on their own or desiring to supplement an ODE textbook being used in a course they are taking with a text offering a more conceptual approach to the subject.*

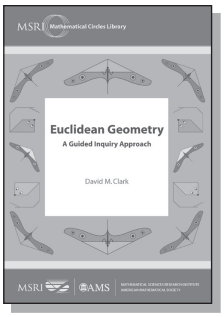
Contents: Warming up to enumerative geometry ◆ Enumerative geometry in the projective plane ◆ Stable maps and enumerative geometry ◆ Crash course in topology and manifolds ◆ Crash course in C∞ manifolds and cohomology ◆ Cellular decompositions and line bundles ◆ Enumerative geometry of lines ◆ Excess intersection ◆ Rational curves on the quintic threefold ◆ Mechanics Introduction to supersymmetry ◆ Introduction to string theory ◆ Topological quantum field theory ◆ Quantum cohomology and enumerative geometry ◆ *Bibliography* ◆ *Index*

2012	**224 pp**	**Paperback**
978-0-8218-8730-1		**₹ 1,320.00**

Euclidean Geometry: A Guided Inquiry Approach

AMS

David M Clark
State University of New York, New Paltz, USA



Geometry has been an essential element in the study of mathematics since antiquity. Traditionally, we have also learned formal reasoning by studying Euclidean geometry. In this book, David Clark develops a modern axiomatic approach to this ancient subject, both in content and presentation. Mathematically, Clark has chosen a new set of axioms that draw on a modern understanding of set theory and logic, the real number continuum and measure theory, none of which were available in Euclid's time. The result is a development of the standard content of Euclidean geometry with the mathematical precision of Hilbert's foundations of geometry. In particular, the book covers all the topics listed in the Common Core State

Standards for high school synthetic geometry. The presentation uses a guided inquiry, active learning pedagogy. Students benefit from the axiomatic development because they themselves solve the problems and prove the theorems with the instructor serving as a guide and mentor. Students are thereby empowered with the knowledge that they can solve problems on their own without reference to authority. This book, written for an undergraduate axiomatic geometry course, is particularly well suited for future secondary school teachers.

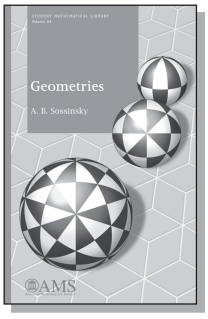
Contents: *Acknowledgements* ◆ *Preface* ◆ *Introduction to the Student* ◆ Chapter 1. Congruent Figures ◆ Congruence and Isometries ◆ The Language of Geometry ◆ Construction Problems ◆ Chapter ◆ Axioms, Theorems and Proofs ◆ Chapter 3. Area Measure ◆ Closed Regions and Parallels ◆ Measuring Areas ◆ Chapter 4. Angle Measure ◆ Chapter 5. Similar Figures ◆ Similarity and Dilations ◆ Similar Triangles ◆ Chapter 6. Trigonometric Ratios ◆ Chapter 7. Circle Measure ◆ Chapter 8. Perspective Geometry ◆ Solid Geometry ◆ Perspective Projections ◆ Perspective Drawing ◆ *Appendix A. The Axioms* ◆ *Appendix B. Guidelines for the Instructor* ◆ *Appendix C. Hilbert's Axioms* ◆ *Bibliography* ◆ *Index*

2016	160 pp	Paperback
978-1-4704-2592-0		₹ 1,050.00

Geometries

AMS

A B Sossinsky
Independent University of Moscow, Russia



The book is an innovative modern exposition of geometry, or rather, of geometries; it is the first textbook in which Felix Klein's Erlangen program (the action of transformation groups) is systematically used as the basis for defining various geometries. The course of study presented is dedicated to the proposition that all geometries are created equal--although some, of course, remain more equal than others. The author concentrates on several of the more distinguished and beautiful ones, which include what he terms "toy geometries", the geometries of platonic bodies, discrete geometries, and classical continuous geometries. The text is based on first-year semester course lectures delivered at the independent university of Moscow in 2003 and 2006. It is by no means a formal algebraic or analytic treatment of geometric topics, but rather, a highly visual exposition containing upwards of 200 illustrations. The reader is expected to possess a familiarity with elementary Euclidean geometry, albeit those lacking this knowledge may refer to a compendium in chapter 0. Per the author's predilection, the book contains very little regarding the axiomatic approach to geometry (save for a single chapter on the history of non-Euclidean geometry), but two appendices provide a detailed treatment of Euclid's and Hilbert's axiomatics. Perhaps the most important aspect of this course is the problems, which appear at the end of each chapter and are supplemented with answers at the conclusion of the text. By analyzing and solving these problems, the reader will become capable of thinking and working geometrically, much more so than by simply learning the theory.

Contents: *Preface* ◆ Chapter 0. About Euclidean Geometry ◆ The axioms of Euclidean plane geometry ◆ Commentary ◆ Rotations ◆ Parallel translations and vectors ◆ Triangles: congruence, properties ◆ Homothety and similitude ◆ Angle measure and trigonometry ◆ Properties of the circle ◆ Isometries of the plane ◆ Space geometry ◆ Chapter 1. Toy Geometries and Main Definitions ◆ Isometries of the Euclidean plane and space ◆ Symmetries of some figures ◆ Transformation groups ◆ The category of geometries ◆ Some philosophical remarks ◆ Problems ◆ Chapter 2. Abstract Groups and Group Presentations ◆ Abstract groups ◆ Morphisms of Groups ◆ Subgroups ◆ The Lagrange Theorem ◆ Quotient groups ◆ Free groups and permutations ◆ Group presentations ◆ Cayley's theorem ◆ Problems ◆ Chapter 3. Finite Subgroups of SO(3) and the Platonic Bodies ◆ The Platonic bodies in art, philosophy, and science ◆ Finite subgroups of SO(3) ◆ The five regular polyhedra ◆ The five Kepler

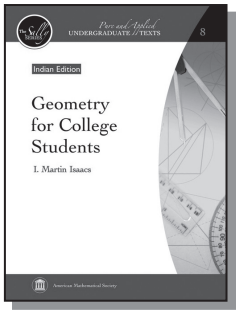
cubes ◆ Regular polytopes in higher dimensions ◆ Problems ◆ Chapter 4. Discrete Subgroups of the Isometry Group of the Plane and Tilings ◆ Tilings in architecture, art, and science ◆ Tilings and crystallography ◆ Isometries of the plane ◆ Discrete groups and discrete geometries ◆ The seventeen regular tilings ◆ The 230 crystallographic groups ◆ Problems Chapter 5. Reflection Groups and Coxeter Geometries ◆ An example: the kaleidoscope ◆ Coxeter polygons and polyhedra ◆ Coxeter geometries on the plane ◆ Coxeter geometries in Euclidean space R3 ◆ Coxeter schemes and the classification theorem ◆ Problems ◆ Chapter 6. Spherical Geometry ◆ A list of classical continuous geometries ◆ Some basic facts from Euclidean plane geometry ◆ Lines, distances, angles, polars, and perpendiculars ◆ Biangles and triangles in S2 ◆ Other theorems about triangles ◆ Coxeter triangles on the sphere S2 ◆ Two-dimensional elliptic geometry ◆ Problems ◆ Chapter 7. The Poincare Disk Model of Hyperbolic Geometry ◆ Inversion and orthogonal circles ◆ Definition of the disk model ◆ Points and lines in the hyperbolic plane ◆ Perpendiculars ◆ Parallels and nonintersecting lines ◆ Sum of the angles of a triangle ◆ Rotations and circles in the hyperbolic plane ◆ Hyperbolic geometry and the physical world ◆ Problems ◆ Chapter 8. The Poincaré Half-Plane Model ◆ Affine and linear-fractional transformations of C ◆ The Poincare half-plane model ◆ Perpendiculars and parallels ◆ Isometries w.r.t. Mobius distance ◆ Problems ◆ Chapter 9. The Cayley–Klein Model ◆ Isometry and the Cayley–Klein model ◆ Parallels in the Cayley–Klein model ◆ Perpendiculars in the Cayley–Klein model ◆ The hyperbolic line and relativity ◆ Problems ◆ Chapter 10. Hyperbolic Trigonometry and Absolute Constants ◆ Isomorphism between the two disk models ◆ Isomorphism between the two Poincare models ◆ Hyperbolic functions ◆ Trigonometry on the hyperbolic plane ◆ Angle of parallelism and Schweikart constant ◆ Problems ◆ Chapter 11. History of Non-Euclidean Geometry ◆ Euclid's Fifth Postulate ◆ Statements equivalent to the Fifth Postulate ◆ Gauss ◆ Lobachevsky ◆ Bolyai ◆ Beltrami, Helmholtz, Lie, Cayley, Klein, Poincare ◆ Hilbert ◆ Chapter 12. Projective Geometry ◆ The projective plane as a geometry ◆ Homogeneous coordinates ◆ Projective transformations ◆ Cross-ratio of collinear points ◆ Projective duality ◆ Conics in RP2 ◆ The Desargues, Pappus, and Pascal theorems ◆ Projective space ◆ Problems ◆ Chapter 13. "Projective Geometry Is All Geometry" ◆ Subgeometries ◆ The Euclidean plane as a subgeometry of the projective plane RP2 ◆ The hyperbolic plane as a subgeometry of the projective plane RP2 ◆ The elliptic plane as a subgeometry of RP2 ◆ Problems ◆ Chapter 14. Finite Geometries ◆ Small finite geometries ◆ Finite fields ◆ Example: the finite affine plane over F(5) ◆ Example: the finite affine plane over F(22) ◆ Example of a finite projective plane ◆ Axioms for finite affine planes ◆ Axioms for finite projective planes ◆ Constructing projective planes over finite fields ◆ The Desargues theorem ◆ Algebraic structures in finite projective planes ◆ Open problems and conjectures ◆ Problems ◆ Chapter 15. The Hierarchy of Geometries ◆ Dimension one: lines ◆ Dimension two: planes ◆ From metric to affine to projective ◆ Three-dimensional space geometries ◆ Finite and discrete geometries ◆ The hierarchy of geometries ◆ Problems ◆ Chapter 16. Morphisms of Geometries ◆ Examples of geometric covering spaces ◆ Examples of geometric G-bundles ◆ Lie groups ◆ Examples of geometric vector bundles ◆ Geometric G-bundles 16.6. The Milnor construction ◆ Problems ◆ *Appendix A. Excerpts from Euclid's "Elements" Postulates of Book I The Common Notions The Definitions of Book I The Propositions of Book I Conclusion* ◆ *Appendix B. Hilbert's Axioms for Plane Geometry I ◆ Axioms of connection II ◆ Axioms of order III ◆ Axiom of parallels IV ◆ Axioms of congruence V ◆ Axiom of continuity Consistency of Hilbert's axioms Conclusion Answers & Hints ◆ Bibliography ◆ Index*

2016	304 pp	Paperback
978-1-4704-2595-1		₹1,525.00

Geometry for College Students

AMS

I Martin Isaacs
Professor of Mathematics, University of Wisconsin, Madison, USA



One of the challenges many mathematics students face occurs after they complete their study of basic

calculus and linear algebra, and they start taking courses where they are expected to write proofs. Historically, students have been learning to think mathematically and to write proofs by studying Euclidean geometry. *In the author's opinion, geometry is still the best way to make the transition from elementary to advanced mathematics.*

The book begins with a thorough review of high school geometry, then goes on to discuss special points associated with triangles, circles and certain associated lines, Ceva's theorem, vector techniques of proof, and compass-and-straightedge constructions. There is also some emphasis on proving numerical formulas like the laws of sines, cosines, and tangents, Stewart's theorem, Ptolemy's theorem, and the area formula of Heron.

An important difference of this book from the majority of modern college geometry texts is that it avoids axiomatics. The students using this book have had very little experience with formal mathematics. Instead, the focus of the course and the book is on interesting theorems and on the techniques that can be used to prove them. *This makes the book suitable to second- or third-year mathematics majors and also to secondary mathematics education majors, allowing the students to learn how to write proofs of mathematical results and, at the end, showing them what mathematics is really all about.*

Contents: The Basics ◆ Triangles ◆ Circles and Lines ◆ Ceva's Theorem and its Relatives ◆ Vector Methods of Proof ◆ Geometric Constructions ◆ *Some Further Reading* ◆ *Index*

2012	**240 pp**	**Paperback**
978–0–8218–8706–6		**₹ 1,320.00**

Hodge Theory, Complex Geometry and Representation Theory

Mark Green
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Phillip Griffiths
Institute of Advanced Study, Princeton, NJ

Matt Kerr
Washington University, St. Louis, MO

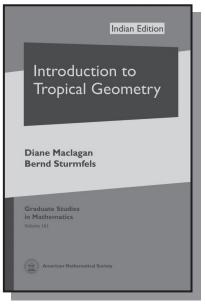
See page 9

Introduction to Tropical Geometry

AMS

Diane Maclagan
University of Warwick, Coventry, United Kingdom

Bernd Sturmfels
University of California, Berkeley, Berkeley, CA



Tropical geometry is a combinatorial shadow of algebraic geometry, offering new polyhedral tools to compute invariants of algebraic varieties. It is based on tropical algebra, where the sum of two numbers is their minimum and the product is their sum. This turns polynomials into piecewise-linear functions, and their zero sets into polyhedral complexes. These tropical varieties retain a surprising amount of information about their classical counterparts.

Tropical geometry is a young subject that has undergone a rapid development since the beginning of the 21st century. While establishing itself as an area in its own right, deep connections have been made to many branches of pure and applied mathematics.

This book offers a self-contained introduction to tropical geometry, suitable as a course text for beginning graduate students. Proofs are provided for the main results, such as the Fundamental Theorem and the Structure Theorem.

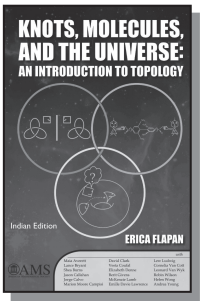
Numerous examples and explicit computations illustrate the main concepts. Each of the six chapters concludes with problems that will help the readers to practice their tropical skills, and to gain access to the research literature.

2017	**376 pp**	**Paperback**
978–1–4704–3731–2		**₹ 1,770.00**

Knots, Molecules, and the Universe: An Introduction to Topology

AMS

Erica Flapan
Pomona College, Claremont, CA



This book is an elementary introduction to geometric topology and its applications to chemistry, molecular biology and cosmology. It does not assume any mathematical or scientific background, sophistication, or even motivation to study mathematics. It is meant to be fun and engaging while drawing students in to learn about fundamental topological and geometric ideas. Though the book can be read and enjoyed by non-mathematicians, college students, or even eager high school students, it is intended to be used as an undergraduate textbook. The book is divided into three parts corresponding to the three areas referred to in the title. Part 1 develops techniques that enable two- and three-dimensional creatures to visualise possible shapes for their universe and to use topological and geometric properties to distinguish one such space from another. Part 2 is an introduction to knot theory with an emphasis on invariants. Part 3 presents applications of topology and geometry to molecular symmetries, DNA and proteins. Each chapter ends with exercises that allow for better understanding of the material.

The style of the book is informal and lively. Though all of the definitions and theorems are explicitly stated, they are given in an intuitive rather than a rigorous form, with several hundreds of figures illustrating the exposition. This allows students to develop intuition about topology and geometry without getting bogged down in technical details.

2017	**404 pp**	**Paperback**
978–1–4704–3735–0		**₹1,855.00**

Mathematical Circles (Russian Experience)

Dmitri Fomin
St. Petersburg State University, Russia

Sergey Genkin
Microsoft Corporation

Ilia Itenberg
Institut de Recherche Mathématique de Rennes, France

This book was produced by a remarkable cultural circumstance in the former Soviet Union which fostered the creation of groups of students, teachers, and mathematicians called *Mathematical Circles*. The work is predicated on the idea that studying mathematics can generate the same enthusiasm as playing a team sport—without necessarily being competitive. *This book is intended for both students and teachers who love mathematics and want to study its various branches beyond the limits of the school curriculum. It is also a book of mathematical recreation and, at the same time, a book containing vast theoretical and problem material in the main areas of what the authors consider to be 'extracurricular mathematics'.*

1998	**288 pp**	**Paperback**
978–81–7371–115–2		**₹745.00**

Modern Geometry – Methods and Applications: Part I: The Geometry of Surfaces, Transformation Groups, and Fields
(Second Edition)

B A Dubrovin, A T Fomenko & S P Novikov

This is the first volume of a three-volume introduction to modern geometry, with emphasis on applications to other areas of mathematics and theoretical physics. Topics covered include tensors and their differential calculus, the calculus of variations in one and several dimensions, and geometric field theory. This material is explained in as simple and concrete a language as possible, in a terminology acceptable to physicists. The text for the second edition has been substantially revised.

Contents: Geometry in Regions of a Space, Basic Concepts ◆ The Theory of Surfaces ◆ Tensors: The Algebraic Theory ◆ The Differential Calculus of Tensors ◆ The Elements of the Calculus of Variations

◆ The Calculus of Variations in Several Dimensions, Fields and Their Geometric Invariants

2010	484 pp	Paperback
978–81–8489–655–8		₹ 1,165.00

Modern Geometry – Methods and Applications: Part II. The Geometry and Topology of Manifolds

B A Dubrovin, A T Fomenko & S P Novikov

This is the second volume of a three-volume introduction to modern geometry, with emphasis on applications to other areas of mathematics and theoretical physics. Topics covered include homotopy groups, fibre bundles, dynamical systems, and foliations. The exposition is simple and concrete, and in a terminology palatable to physicists.

Contents: Examples of Manifolds ◆ Foundational Questions. Essential Facts Concerning Functions on a Manifold. Typical Smooth Mappings ◆ The Degree of a Mapping. The Intersection Index of Submanifolds ◆ Orientability of Manifolds. The Fundamental Group. Covering Spaces (Fibre Bundles with Discrete Fibre) ◆ Homotopy Groups ◆ Smooth Fibre Bundles ◆ Some Examples of Dynamical Systems and Foliations on Manifolds ◆ The Global Structure of Solutions of Higher-Dimensional Variational ◆ *Problems* ◆ *Bibliography* ◆ *Index*

2010	448 pp	Paperback
978–81–8489–659–6		₹ 1,165.00

Modern Geometry – Methods and Applications: Part III. Introduction to Homology Theory

B A Dubrovin, A T Fomenko & S P Novikov

Over the past 15 years, the geometrical and topological methods of the theory of manifolds have assumed a central role in the most advanced areas of pure and applied mathematics as well as theoretical physics. The three volumes of *Modern Geometry-Methods and Applications* contain a concrete expositions of these methods together with their main application in mathematics and physics. *The third volume, presented in highly accessible language, concentrates on homology theory. It contains an introduction to the contemporary methods for the calculation of homotopy groups and the classification of manifolds. Both scientists and students of mathematics as well as theoretical physics will find this book to be a valuable reference and text.*

Contents: *Preface* ◆ Homology and Cohomology. Computational Recipes ◆ Cohomology groups as classes of closed differential forms. Their homotopy invariance ◆ The homology theory of algebraic complexes ◆ Simplicial complexes. Their homology and cohomology groups. The classification of the two-dimensional closed surfaces ◆ Attaching cells to a topological space. Cell spaces. Theorems on the reduction of cell spaces. Homology groups and the fundamental groups of surfaces and certain other manifolds ◆ The singular homology and cohomology groups. Their homotogy invariance. The exact sequence of a pair. Relative homology groups ◆ The singular homology of cell complexes. Its equivalence with cell homology. Poincare duality in simplicial homology ◆ The homology groups of a product of spaces. Multiplication in cohomology rings. The cohomology theory of H-spaces and Liegroups. The eo homology of the unitary groups ◆ The homology theory offibre bundles (skew products) ◆ The extension problem for maps, homotopies, and cross-sections. Obstruction cohomology classes ◆ Homology theory and methods for computing homotopy groups. The Cartan-Serre theorem. Cohomology operations. Vector bundles. ◆ Homology theory and the fundamental group ◆ The cohomology groups of hyperelliptic Riemann surfaces. Jacobi tori. Geodesics on multi-axis ellipsoids. Relationship to finite-gapotentials ◆ The simplest properties of Kahler manifolds. Abelian tori ◆ Sheaf cohomology ◆ Critical Points of Smooth Functions and Homology Theory ◆ Morse functions and cell complexes ◆ The Morse inequalities ◆ Morse-Smale functions. Handles. Surfaces ◆ Poincare duality ◆ Critical points of smooth functions and the Lyusternik - Shnirelman category of a manifold ◆ Critical manifolds and the Morse inequalities. Functions with symmetry ◆ Critical points of functionals and the topology of the path space Ω(M) ◆ Applications of the index theorem ◆ The periodic problem of the calculus of variations ◆ Morse functions on 3-dimensional manifolds and Heegaard splittings ◆ Unitary Bott periodicity and higher-dimensional variational problems ◆ Morse theory and certain motions in the planar nobody problem ◆ Cobordisms and Smooth Structures ◆ Characteristic numbers. Cobordisms. Cycles

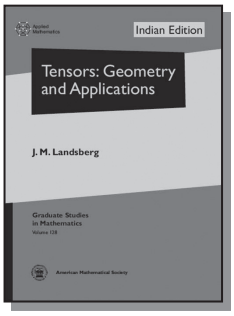
and submanifolds. The signature of a manifold ◆ Smooth structures on the 7-dimensional sphere. The classification problem for smooth manifolds (normal invariants). Reidemeister torsion and the fundamental hypothesis (Hauptvermutung) of combinatorial topology ◆ *Bibliography* ◆ *Appendix 1 (by S. P. Novikov)* ◆ *An Analogue of Morse Theory for Many-Valued Functions. Certain Properties of Poisson Brackets* ◆ *Appendix 2 (by A. T. Fomenko)* ◆ *Plateau's Problem. Spectral Bordisms and Globally Minimal Surfaces in Riemannian Manifolds* ◆ *Index* ◆ *Errata to Parts I and 11* ◆ *Index* ◆ *Errata to Parts I and 11*

2010	**428 pp**	**Paperback**
978–81–8489–660–2		**₹ 1,165.00**

Tensors: Geometry and Applications

AMS

J M Landsberg
Texas A&M University, College Station, USA



Tensors are ubiquitous in the sciences. The geometry of tensors is both a powerful tool for extracting information from data sets, and a beautiful subject in its own right. *This book has three intended uses: a classroom textbook, a reference work for researchers in the sciences, and an account of classical and modern results in (aspects of) the theory that will be of interest to researchers in geometry. For classroom use, there is a modern introduction to multilinear algebra and to the geometry and representation theory needed to study tensors, including a large number of exercises. For researchers in the sciences, there is information on tensors in table format for easy reference and a summary of the state of the art in elementary language. This is the first book containing many classical results regarding tensors.* Particular applications treated in the book include the complexity of matrix multiplication, P versus NP, signal processing, phylogenetics, and algebraic statistics.

For geometers, there is material on secant varieties, G-varieties, spaces with finitely many orbits and how these objects arise in applications, discussions of numerous open questions in geometry arising in applications, and expositions of advanced topics such as the proof of the Alexander-Hirschowitz theorem and of the Weyman-Kempf method for computing syzygies.

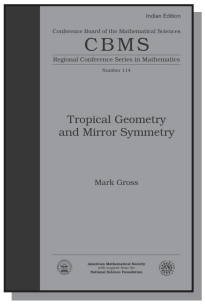
Contents: *Preface* ◆ *Part 1:* Motivation from applications, multilinear algebra, and elementary results: Introduction ◆ Multilinear algebra: Elementary results on rank and border rank ◆ *Part 2:* Geometry and representation theory: Algebraic geometry for spaces of tensors ◆ Secant varieties ◆ Exploiting symmetry: Representation theory for spaces of tensors ◆ Tests for border rank: Equations for secant varieties ◆ Additional varieties useful for spaces of tensors ◆ Rank ◆ Normal forms for small tensors ◆ *Part 3:* Applications: The complexity of matrix multiplication ◆ Tensor decomposition ◆ P v. NP ◆ Varieties of tensors in phylogenetics and quantum mechanics ◆ *Part 4:* Advanced topics: Overview of the proof of the Alexander-Hirschowitz theorem ◆ Representation theory ◆ Weyman's method ◆ *Bibliography* ◆ *Index*

2013	**464 pp**	**Paperback**
978–1–4704–0923–4		**₹ 1,390.00**

Tropical Geometry and Mirror Symmetry

Mark Gross
University of California, San Diego, San Diego, CA

AMS



Tropical geometry provides an explanation for the remarkable power of mirror symmetry to connect complex and symplectic geometry. The main theme of this book is the interplay between tropical geometry and mirror symmetry, culminating in a description of the recent work of Gross and Siebert using log geometry to understand how the tropical

world relates the A- and B-models in mirror symmetry.

The text starts with a detailed introduction to the notions of tropical curves and manifolds, and then gives a thorough description of both sides of mirror symmetry for projective space, bringing together material which so far can only be found scattered throughout the literature.

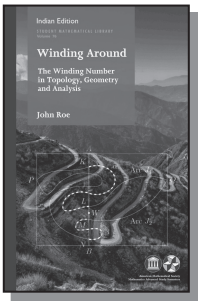
Next follows an introduction to the log geometry of Fontaine-Illusie and Kato, as needed for Nishinou and Siebert's proof of Mikhalkin's tropical curve counting formulas. This latter proof is given in the fourth chapter. The fifth chapter considers the mirror, B-model side, giving recent results of the author showing how tropical geometry can be used to evaluate the oscillatory integrals appearing. The final chapter surveys reconstruction results of the author and Siebert for 'integral tropical manifolds'. A complete version of the argument is given in two dimensions.

2017	**336 pp**	**Paperback**
978–1–4704–3721–3		**₹ 1,690.00**

Winding Around: The Winding Number in Topology, Geometry and Analysis

AMS

John Roe
Pennsylvania State University, State College, PA



The Winding Number is one of the most basic invariants in topology. It measures the number of times a moving point Pp goes around a fixed point QQ, provided that Pp travels on a path that never goes through QQ and that the final position of Pp is the same as its starting position. This simple idea has far reaching applications. The reader of this book will learn how the winding number can help us show that every polynomial equation has a root (the fundamental theorem of algebra), guarantee a fair division of three objects in space by a single planar cut (the ham sandwich theorem), explain why every simple closed curve has an inside and an outside (the Jordan curve theorem), relate calculus to curvature and the singularities of vector fields (the Hopf index theorem), allow one to subtract infinity from infinity and get a finite answer (Toeplitz operators), generalise to give a fundamental and beautiful insight into the topology of matrix groups (the Bott periodicity theorem).

All these subjects and more are developed starting only from mathematics that is common in final-year undergraduate courses. This book is published in cooperation with Mathematics Advanced Study Semesters.

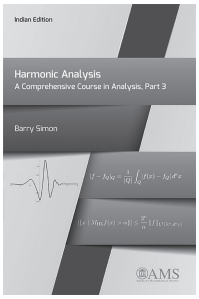
2017	**288 pp**	**Paperback**
978–1–4704–3846–3		**₹ 1,610.00**

Harmonic Analysis

Harmonic Analysis: A Comprehensive Course in Analysis, Part 3

AMS PRINT ON DEMAND

Barry Simon
California Institute of Technology, Pasadena, CA



A Comprehensive Course in Analysis by Poincaré Prize winner Barry Simon is a five-volume set that can serve as a graduate-level analysis textbook with a lot of additional bonus information, including hundreds of problems and numerous notes that extend the text and provide important historical background. Depth and breadth of exposition make this set a valuable reference source for almost all areas of classical analysis.

Part 3 returns to the themes of Part 1 by discussing pointwise limits (going beyond the usual focus on the Hardy-Littlewood maximal function by including ergodic theorems and

martingale convergence), p harmonic functions and potential theory, frames and wavelets, H spaces (including bounded mean oscillation (BMO)) and, in the final chapter, lots of inequalities, including Sobolev spaces, Calderon-Zygmund estimates, and hypercontractive semigroups.

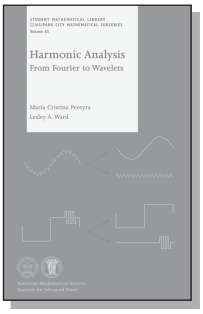
2017	784 pp	Paperback
978–14–7043–778–7		₹ 2050.00

Harmonic Analysis: From Fourier to Wavelets

AMS

María Cristina Pereyra
The University of New Mexico, Albuquerque, USA

Lesley A Ward
University of South Australia, Mawson Lakes Campus, Adelaide, Australia



In the last 200 years, harmonic analysis has been one of the most influential bodies of mathematical ideas, having been exceptionally significant both in its theoretical implications and in its enormous range of applicability throughout mathematics, science, and engineering. In this book, the authors convey the remarkable beauty and applicability of the ideas that have grown from Fourier theory. They present for an advanced undergraduate and beginning graduate student audience the basics of harmonic analysis, from Fourier's study of the heat equation, and the decomposition of functions into sums of cosines and sines (frequency analysis), to dyadic harmonic analysis, and the decomposition of functions into a haar basis (time localization). While concentrating on the Fourier and Haar cases, the book touches on aspects of the world that lies between these two different ways of decomposing functions: time-frequency analysis (wavelets). Both finite and continuous perspectives are presented, allowing for the introduction of discrete Fourier and Haar transforms and fast algorithms, such as the fast Fourier transform (fft) and its wavelet analogues. The approach combines rigorous proof, inviting motivation, and numerous applications. Over 250 exercises are included in the text. Each chapter ends with ideas for projects in harmonic analysis that students can work on independently.

Contents: *List of figures* ◆ *List of tables IAS/Park City Mathematics Institute* ◆ *Preface Suggestions for instructors* ◆ *Acknowledgements* ◆ Chapter 1. Fourier series: Some motivation ◆ An example: Amanda calls her mother ◆ The main questions ◆ Fourier series and Fourier coefficients ◆ History, and motivation from the physical world ◆ Project: Other physical models ◆ Chapter 2. Interlude: Analysis concepts ◆ Nested classes of functions on bounded intervals ◆ Modes of convergence ◆ Interchanging limit operations ◆ Density ◆ Project: Monsters, Take I ◆ Chapter 3. Pointwise convergence of Fourier series ◆ Pointwise convergence: Why do we care? ◆ Smoothness vs. convergence ◆ A suite of convergence theorems ◆ Project: The Gibbs phenomenon ◆ Project: Monsters, Take II ◆ Chapter 4. Summability methods ◆ Partial Fourier sums and the Dirichlet kernel ◆ Convolution ◆ Good kernels, or approximations of the identity ◆ Fejér kernels and Cesàro means ◆ Poisson kernels and Abel means ◆ Excursion into Lp(T) ◆ Project: Weyl's Equidistribution Theorem ◆ Project: Averaging and summability methods ◆ Chapter 5. Mean-square convergence of Fourier series ◆ Basic Fourier theorems in L2(T) ◆ Geometry of the Hilbert space L2(T) ◆ Completeness of the trigonometric system ◆ Equivalent conditions for completeness ◆ Project: The isoperimetric problem ◆ Chapter 6. A tour of discrete Fourier and Haar analysis ◆ Fourier series vs. discrete Fourier basis ◆ Short digression on dual bases in CN ◆ The Discrete Fourier Transform and its inverse ◆ The Fast Fourier Transform (FFT) ◆ The discrete Haar basis ◆ The Discrete Haar Transform ◆ The Fast Haar Transform ◆ Project: Two discrete Hilbert transforms ◆ Project: Fourier analysis on finite groups ◆ Chapter 7. The Fourier transform in paradise ◆ From Fourier series to Fourier integrals ◆ The Schwartz class ◆ The time–frequency dictionary for S(R) ◆ The Schwartz class and the Fourier transform ◆ Convolution and approximations of the identity ◆ The Fourier Inversion Formula and Plancherel ◆ Lp norms on S(R) ◆ Project: A bowl of kernels ◆ Chapter 8.

Beyond paradise ◆ Continuous functions of moderate decrease ◆ Tempered distributions ◆ The time–frequency dictionary for S (R) ◆ The delta distribution ◆ Three applications of the Fourier transform ◆ Lp(R) as distributions ◆ Project: Principal value distribution 1/x ◆ Project: Uncertainty and primes ◆ Chapter 9. From Fourier to wavelets, emphasizing Haar ◆ Strang's symphony analogy ◆ The windowed Fourier and Gabor bases ◆ The wavelet transform ◆ Haar analysis ◆ Haar vs. Fourier ◆ Project: Local cosine and sine bases ◆ Project: Devil's advocate ◆ Project: Khinchine's Inequality ◆ Chapter 10. Zooming properties of wavelets ◆ Multiresolution analyses (MRAs) ◆ Two applications of wavelets, one case study ◆ From MRA to wavelets: Mallat's Theorem ◆ How to find suitable MRAs ◆ Projects: Twin dragon; infinite mask ◆ Project: Linear and nonlinear approximations ◆ Chapter 11. Calculating with wavelets ◆ The Haar multiresolution analysis ◆ The cascade algorithm ◆ Filter banks, Fast Wavelet Transform ◆ A wavelet library ◆ Project: Wavelets in action ◆ Chapter 12. The Hilbert transform ◆ In the frequency domain: A Fourier multiplier ◆ In the time domain: A singular integral ◆ In the Haar domain: An average of Haar shifts ◆ Boundedness on Lp of the Hilbert transform ◆ Weak boundedness on L1(R) ◆ Interpolation and a festival of inequalities ◆ Some history to conclude our journey ◆ Project: Edge detection and spectroscopy ◆ Projects: Harmonic analysis for researchers ◆ *Appendix. Useful tools ◆ A.1. Vector spaces, norms, inner products ◆ A.2. Banach spaces and Hilbert spaces ◆ A.3. Lp(R), density, interchanging limits on R ◆ Bibliography Name index ◆ Subject index*

2016	**436 pp**	**Paperback**
978–1–4704–2564–7		**₹ 1,670.00**

History of Mathematics

Mathematical Century, The: The 30 Greatest Problems of the Last 100 Years

Piergiorgio Odifreddi
Professor of Mathematical Logic, University of Turin; Visiting Professor, Cornell University, Ithaca, USA

The author concentrates on thirty highlights of pure and applied mathematics. He opens by discussing the four main philosophical foundations of mathematics of the nineteenth century and ends by describing the four most important open mathematical problems of the twenty-first century.

He devotes equal attention to pure and applied mathematics, with applications ranging from physics and computer science to biology and economics.

Special attention is dedicated to the famous '23 problems' outlined by David Hilbert in his address to the *International Congress of Mathematicians in 1900* as a research programme for the new century, and to the work of the winners of the Fields Medal, the equivalent of a Nobel Prize in mathematics.

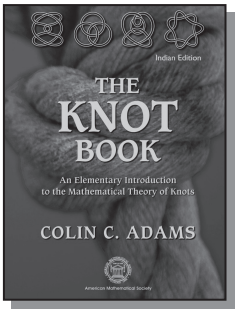
2005	**224 pp**	**Paperback**
978–81–7371–542–6		**₹ 870.00**

Knot Theory

Knot Book, The: An Elementary Introduction to the Mathematical Theory of Knots

AMS

Colin C Adams
Williams College, Williamstown, USA



Knots are familiar objects. We use them to moor our boats, to wrap our packages, to tie our shoes. Yet the mathematical theory of knots quickly leads to deep results in topology and geometry. *The Knot Book* is an introduction to this rich theory, starting with our familiar understanding of knots and a bit of college algebra and finishing with exciting topics of current research.

The Knot Book *is also about the excitement of doing mathematics. Colin Adams engages the reader with fascinating examples, superb figures, and thought-provoking ideas. He also presents the remarkable applications of knot theory to modern chemistry, biology, and physics.*

This is a compelling book that will comfortably escort you into the marvelous world of knot

theory. Whether you are a mathematics student, someone working in a related field, or an amateur mathematician, you will find much of interest in The Knot Book.

Colin Adams received the Mathematical Association of America (MAA) Award for Distinguished Teaching and has been an MAA Polya Lecturer and a Sigma Xi Distinguished Lecturer.

Contents: Introduction ◆ Tabulating knots ◆ Invariants of knots ◆ Surfaces and knots ◆ Types of knots ◆ Polynomials ◆ Biology, chemistry, and physics ◆ Knots, links, and graphs ◆ Topology ◆ Higher dimensional knotting ◆ Knot jokes and pastimes ◆ *Appendix* ◆ *Suggested readings and references* ◆ *Index* ◆ *Corrections to the 2004 AMS printing*

2012	**322 pp**	**Paperback**
978–0–8218–8723–3		**₹1,525.00**

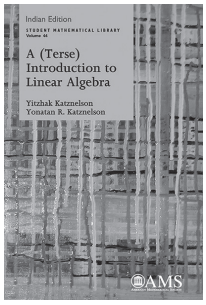
Linear Algebra

A (Terse) Introduction to Linear Algebra

AMS PRINT ON DEMAND

Yitzhak Katznelson
Stanford University, Stanford, CA

Yonatan R. Katznelson
University of California, Santa Cruz, CA



Linear algebra is the study of vector spaces and the linear maps between them. It underlies much of modern mathematics and is widely used in applications.

A (Terse) Introduction to Linear Algebra is a concise presentation of the core material of the subject—those elements of linear algebra that every mathematician, and everyone who uses mathematics, should know. It goes from the notion of a finite-dimensional vector space to the canonical forms of linear operators and their matrices, and covers along the way such key topics as: systems of linear equations, linear operators and matrices, determinants, duality, and the spectral theory of operators on inner-product spaces.

The last chapter offers a selection of additional topics indicating directions in which the core material can be applied. The Appendix provides all the relevant background material.

Written for students with some mathematical maturity and an interest in abstraction and formal reasoning, the book is self-contained and is appropriate for an advanced undergraduate course in linear algebra.

Contents: *Preface* ◆ Vector Spaces ◆ Linear Operators and Matrices ◆ Duality of Vector Spaces ◆ Determinants ◆ Invariant Subspaces ◆ Inner-Product Spaces ◆ Structure Theorems ◆ Additional Topics ◆ Appendix ◆ A.1 Equivalence relations-partitions ◆ A.2 Maps ◆ A.3 Groups ◆ A.4 Group actions ◆ A.5 Rings and algebras ◆ A.6 Polynomials ◆ *Index*

2020	**228 pp**	**Paperback**
978–14–7045–480–7		**₹1,270**

Applied Linear Algebra: The Decoupling Principle

AMS

(Second Edition)

Lorenzo Sadun
University of Texas at Austin, USA

Linear algebra permeates mathematics, as well as physics and engineering. In this text for junior and senior undergraduates, Sadun treats diagonalization as a central tool in solving complicated problems in these subjects by reducing coupled linear evolution problems to a sequence of simpler decoupled problems. This is the Decoupling Principle.Traditionally, difference equations, Markov chains, coupled oscillators, Fourier series, the wave equation, the Schrödinger equation, and Fourier transforms are treated separately, often in different courses. Here, they are treated as particular instances of the decoupling principle, and their solutions are remarkably similar. By understanding this general principle

and the many applications given in the book, students will be able to recognize it and to apply it in many other settings. Sadun includes some topics relating to infinite-dimensional spaces. He does not present a general theory, but enough so as to apply the decoupling principle to the wave equation, leading to Fourier series and the Fourier transform.

The *second edition* contains a series of explorations. Most are numerical labs in which the reader is asked to use standard computer software to look deeper into the subject. Some explorations are theoretical, for instance, relating linear algebra to quantum mechanics. There is also an appendix reviewing basic matrix operations and another with solutions to a third of the exercises.

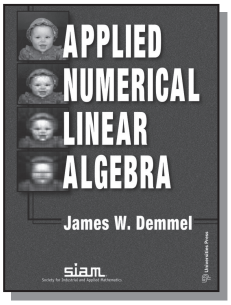
Contents: The Decoupling Principle ◆ Vector Spaces and Bases ◆ Linear Transformations and Operators ◆ An Introduction to Eigenvalues ◆ Some Crucial Applications ◆ Inner Products ◆ Adjoints, Hermitian Operators, and Unitary Operators ◆ The Wave Equation ◆ Continuous Spectra and the Dirac Delta Function ◆ Fourier Transforms ◆ Green's Functions ◆ *Appendix A* ◆ *Appendix B* ◆ *Index*

2011	**392 pp**	**Paperback**
978–0–8218–6887–4		**₹ 1,600.00**

Applied Numerical Linear Algebra

AMS

James Demmel
University of California, CA



Designed for use by first-year graduate students from a variety of engineering and scientific disciplines, this comprehensive textbook covers the solution of linear systems, least squares problems, eigenvalue problems, and the singular value decomposition. The author, who helped design the widely-used LAPACK and ScaLAPACK linear algebra libraries, draws on this experience to present state-of-the-art techniques for these problems, including recommendations of which algorithms to use in a variety of practical situations.

2017	**432 pp**	**Paperback**
978–93–86235–33–6		**₹ 1,795.00**

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India

Amber Habib
Shiv Nadar Institution of Eminence, Delhi NCR, India

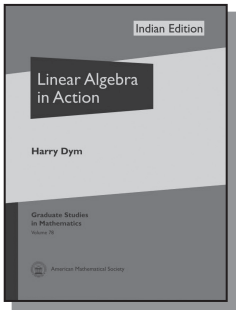
Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India

See page 69

Linear Algebra in Action

AMS

Harry Dym
Weizmann Institute of Science, Rehovot, Israel



Linear algebra permeates mathematics, perhaps more so than any other single subject. It plays an essential role in pure and applied mathematics, statistics, computer science, and many aspects of physics and engineering. *This book conveys in a user-friendly way the basic and advanced techniques of linear algebra from the point of view of a working analyst. The techniques are illustrated by a wide sample of applications and examples that are chosen to highlight the tools of the trade. In short, this is material that the author wishes he had been taught as a graduate student.*

Roughly the first third of the book covers the

basic material of a first course in linear algebra. The remaining chapters are devoted to applications drawn from vector calculus, numerical analysis, control theory, complex analysis, convexity and functional analysis. In particular, fixed point theorems, extremal problems, matrix equations, zero location and eigenvalue location problems, and matrices with nonnegative entries are discussed. Appendices on useful facts from analysis and supplementary information from complex function theory are also provided for the convenience of the reader.

The book is suitable as a text or supplementary reference for a variety of courses on linear algebra and its applications, as well as for self-study.

Contents: Vector spaces ◆ Gaussian elimination ◆ Additional applications of Gaussian elimination ◆ Eigenvalues and eigenvectors ◆ Determinants ◆ Calculating Jordan forms ◆ Normed linear spaces ◆ Inner product spaces and orthogonality ◆ Symmetric, Hermitian and normal matrices ◆ Singular values and related inequalities ◆ Pseudoinverses ◆ Triangular factorization and positive definite matrices ◆ Difference equations and differential equations ◆ Vector valued functions ◆ The implicit function theorem ◆ Extremal problems ◆ Matrix valued holomorphic functions ◆ Matrix equations ◆ Realization theory ◆ Eigenvalue location problems ◆ Zero location problems ◆ Convexity Matrices with nonnegative entries ◆ Some facts from analysis ◆ More complex variables ◆ *Bibliography* ◆ *Notation* ◆ *Index* ◆ *Subject index*

2012	568 pp	Paperback
978-0-8218-8719-6		₹ 1,740.00

Matrix Groups for Undergraduates

AMS

Kristopher Tapp
Williams College, Williamstown, USA

Matrix groups are a beautiful subject and are central to many fields in mathematics and physics. They touch upon an enormous spectrum within the mathematical arena. *This textbook brings them into the undergraduate curriculum. It is excellent for a one-semester course for students familiar with linear and abstract algebra and prepares them for a graduate course on Lie groups.* Matrix Groups for Undergraduates *is concrete and example-driven, with geometric motivation and rigorous proofs.* The story begins and ends with the rotations of a globe. In between, the author combines rigor and intuition to describe basic objects of Lie theory: Lie algebras, matrix exponentiation, Lie brackets, and maximal tori. *The volume is suitable for graduate students and researchers interested in group theory.*

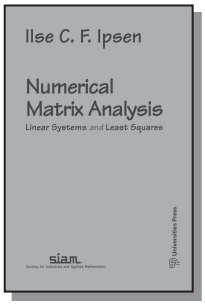
Contents: Why study matrix groups? ◆ Matrices ◆ All matrix groups are real matrix groups ◆ The orthogonal groups ◆ The topology of matrix groups ◆ Lie algebras ◆ Matrix exponentiation ◆ Matrix groups are manifolds ◆ The Lie bracket ◆ Maximal tori ◆ *Bibliography* ◆ *Index*

2011	176 pp	Paperback
978-0-8218-6892-8		₹ 1,020.00

Numerical Matrix Analysis: Linear Systems and Least Squares

AMS

Ilse C F Ipsen
North Carolina State University, Raleigh, NC



This self-contained textbook presents matrix analysis in the context of numerical computation with numerical conditioning of problems and numerical stability of algorithms at the forefront. Using a unique combination of numerical insight and mathematical rigour, it advances readers' understanding of two phenomena—sensitivity of linear systems and least squares problems, and numerical stability of algorithms.

2017	144 pp	Paperback
978-93-86235-38-1		₹ 570.00

Ordinary Differential Equations and Linear Algebra: A Systems Approach

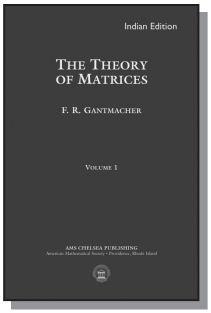
Todd Kapitula
University of New Mexico, Albuquerque, NM

See page 61

Theory of Matrices, The (Volume 1)

AMS

F R Gantmacher



This treatise, by one of Russia's leading mathematicians, gives in easily accessible form a coherent account of matrix theory with a view to *applications in mathematics, theoretical physics, statistics, electrical engineering, etc. The individual chapters have been kept as far as possible independent of each other, so that the reader acquainted with the contents of Chapter 1 can proceed immediately to the chapters of special interest.* Much of the material has been available until now only in the periodical literature.

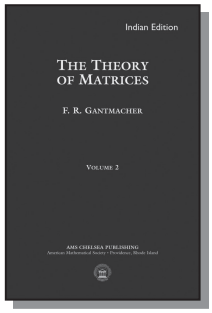
Contents: Matrices and operations on matrices ◆ The algorithm of Gauss and some of its applications ◆ Linear operators in an n-dimensional vector space The characteristic polynomial and the minimal polynomial of a matrix ◆ Functions of matrices ◆ Equivalent transformations of polynomial matrices ◆ Analytic theory of elementary divisors ◆ The structure of a linear operator in an n-dimensional space ◆ Krylov's method of transforming the secular equation ◆ Matrix equations: Linear operators in a unitary space ◆ Quadratic and hermitian forms ◆ *Bibliography* ◆ *Index*

2013	**384 pp**	**Paperback**
978-1-4704-0916-6		**₹ 1,330.00**

Theory of Matrices, The (Volume 2)

AMS

F R Gantmacher



This treatise, by one of Russia's leading mathematicians, gives in easily accessible form a coherent account of matrix theory with a view to applications in mathematics, theoretical physics, statistics, electrical engineering, etc. The individual chapters have been kept as far as possible independent of each other, so that the reader acquainted with the contents of Chapter 1 can proceed immediately to the chapters of special interest. Much of the material has been available until now only in the periodical literature.

Contents: Complex symmetric, skew-symmetric, and orthogonal matrices: Some formulas for complex orthogonal and unitary matrices ◆ Polar decomposition of a complex matrix ◆ The normal form of a complex symmetric matrix ◆ The normal form of a complex skew-symmetric matrix ◆ The normal form of a complex orthogonal matrix ◆ Singular pencils of matrices: Introduction ◆ Regular pencils of matrices ◆ Singular pencils. The reduction theorem ◆ The canonical form of a singular pencil of matrices ◆ The minimal indices of a pencil. Criterion for strong equivalence of pencils Singular pencils of quadratic forms ◆ Application to differential equations ◆ Matrices with non-negative elements: General properties ◆ Spectral properties of irreducible non-negative matrices ◆ Reducible matrices ◆ The normal form of a reducible matrix ◆ Primitive and imprimitive matrices ◆ Stochastic matrices ◆ Limiting probabilities for a homogeneous Markov chain with a finite number of states ◆ Totally non-negative matrices ◆ Oscillatory matrices ◆ Applications of the theory of matrices to the investigation of systems of linear diff erential equations: Systems of linear diff erential equations with variable coefficients. General concepts ◆

Lyapunov transformations Reducible systems ⋄ The canonical form of a reducible system Erugin's theorem ⋄ The matricant ⋄ The multiplicative integral. The infi nitesimal calculus of Volterra ⋄ Differential systems in a complex domain. General properties ⋄ The multiplicative integral in a complex domain ⋄ Isolated singular points ⋄ Regular singularities ⋄ Reducible analytic systems ⋄ Analytic functions of several matrices and their application to the investigation of Differential systems. The papers of Lappo-Danilevskii ⋄ The problem of Routh-Hurwitz and related questions: Introduction ⋄ Cauchy indices ⋄ Routh's algorithm ⋄ The singular case. Examples ⋄ Lyapunov's theorem ⋄ The theorem of Routh-Hurwitz ⋄ Orlando's formula. Singular cases in the Routh-Hurwitz theorem ⋄ The method of quadratic forms ⋄ Determination of the number of distinct real roots of a polynominal ⋄ Infinite Hankel matrices of finite rank ⋄ Determination of the index of an arbitrary rational fraction by the coeffi cients of numerator and denominator ⋄ Another proof of the Routh-Hurwitz theorem ⋄ Some supplements to the Routh-Hurwitz theorem ⋄ Stability criterion of Lienard and Chipart Some properties of Hurwitz polynomials ⋄ Stieltjes' theorem ⋄ Representation of Hurwitz polynomials by continued fractions Domain of stability ⋄ Markov parameters ⋄ Connection with the problem of moments ⋄ Theorems of Markov and Chebyshev ⋄ The generalized Routh-Hurwitz problem ⋄ *Bibliography* ⋄ *Index*

2013	**276 pp**	**Paperback**
978–1–4704–0917–3		**₹ 1,395.00**

Topics in Random Matrix Theory

AMS

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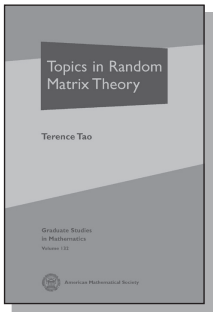

The field of random matrix theory has seen an explosion of activity in recent years, with connections to many areas of mathematics and physics. However, this makes the current state of the field almost too large to survey in a single book. In this graduate text, we focus on one specific sector of the field, namely the spectral distribution of random Wigner matrix ensembles (such as the Gaussian unitary ensemble), as well as iid matrix ensembles. The text is largely self-contained and starts with a review of relevant aspects of probability theory and linear algebra. With over 200 exercises, the book is suitable as an introductory text for beginning graduate students seeking to enter the field.

Contents: *Preface* ⋄ *Acknowledgments* ⋄ Chapter 1. Preparatory material ⋄ A review of probability theory ⋄ Stirling's formula ⋄ Eigenvalues and sums of Hermitian matrices ⋄ Chapter 2. Random matrices ⋄ Concentration of measure ⋄ The central limit theorem ⋄ The operator norm of random matrices ⋄ The semicircular law ⋄ Free probability ⋄ Gaussian ensembles ⋄ The least singular value ⋄ The circular law ⋄ Chapter 3. Related articles ⋄ Brownian motion and Dyson Brownian motion ⋄ The Golden-Thompson inequality ⋄ The Dyson and Airy kernels of GUE via semiclassical analysis ⋄ The mesoscopic structure of GUE eigenvalues ⋄ *Bibliography* ⋄ *Index*

2016	**296 pp**	**Paperback**
978–1–4704–2582–1		**₹ 1,160.00**

Mathematical Finance

Calculus of Finance, The

Amber Habib
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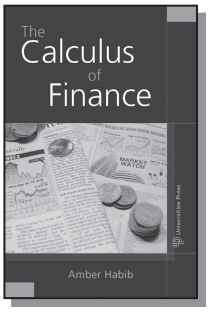

This book is broadly about the mathematical aspects of finance. It introduces the reader to the

basic concepts and products of modern finance and explores various mathematical models dealing with quantification of risk, which form the backbone of modern financial analysis. The emphasis is not so much on the details of the financial world as the basic principles by which one seeks an understanding of it. No prior knowledge of economics or finance is called for—an exposure to basic calculus and probability is all that is required of the reader. The appendix covers this ground in fair detail and would itself serve as a comprehensive primer of mathematics for finance for a beginner.

The book is peppered with examples that use real-life data to ground the theory covered in the book. The exercises to be worked out are also interspersed in the text—their purpose varies from simple practice in applying formulas to extending the ideas learnt to new situations. *Solutions to all the exercise problems are included as Appendix C*, a feature that will be welcomed by both students and faculty.

The book will serve well as an *introductory book on applied mathematics in finance*, of interest to students of mathematics, finance and financial management. For those starting out as practitioners of mathematical finance, this is an ideal introduction.

Contents: Basic Concepts ◆ Deterministic Cash Flows ◆ Random Cash Flows ◆ Forwards and Futures ◆ Stock Price Models ◆ Options ◆ The Black–Scholes Model ◆ Value at Risk ◆ *Appendix A: Calculus* ◆ *Appendix B: Probability and Statistics* ◆ *Appendix C: Solutions to Selected Exercises* ◆ *Bibliography* ◆ *Index*

2011	**296 pp**	**Paperback**
978–81–7371–723–9		**₹ 1,075.00**

Introduction to the Mathematics of Finance

AMS

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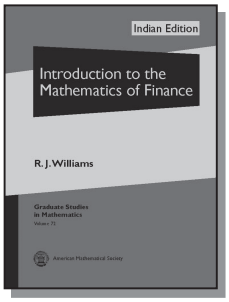

The modern subject of mathematical finance has undergone considerable development, both in theory and practice, since the seminal work of Black and Scholes appeared a third of a century ago. This book is intended as an introduction to some elements of the theory that will enable students and researchers to go on to read more advanced texts and research papers. The book begins with the development of the basic ideas of hedging and pricing of European and American derivatives in the discrete (i.e., discrete time and discrete state) setting of binomial tree models. Then a general discrete finite market model is introduced, and the fundamental theorems of asset pricing are proved in this setting. Tools from probability such as conditional expectation, filtration, (super) martingale, equivalent martingale measure, and martingale representation are all used first in this simple discrete framework. This provides a bridge to the continuous (time and state) setting, which requires the additional concepts of Brownian motion and stochastic calculus. *The simplest model in the continuous setting is the famous Black-Scholes model, for which pricing and hedging of European and American derivatives are developed. The book concludes with a description of the fundamental theorems for a continuous market model that generalizes the simple Black-Scholes model in several directions.*

Contents: Financial Markets and Derivatives ◆ Binomial Model ◆ Finite Market Model ◆ Black-Scholes Model ◆ Multi-dimensional Black-Scholes Model ◆ *Appendix A: Conditional Expectation and Lp-Spaces* ◆ *Appendix B: Discrete Time Stochastic Processes* ◆ *Appendix C: Continuous Time Stochastic Processes* ◆ *Appendix D: Brownian Motion and Stochastic Integration* ◆ *Bibliography* ◆ *Index*

2011	**160 pp**	**Paperback**
978–0–8218–6882–9		**₹ 990.00**

Mathematics of Finance, The: Modeling and Hedging

AMS

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Joseph Stampfli
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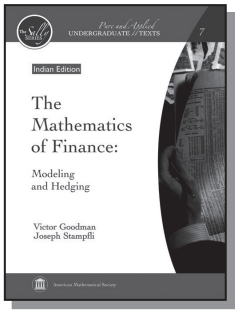

This book is ideally suited for an introductory undergraduate course on financial engineering. It explains the basic concepts of financial derivatives, including put and call options, as well as more complex derivatives such as barrier options and options on futures contracts. Both discrete and continuous models of market behavior are developed in this book. In particular, the analysis of option prices developed by Black and Scholes is explained in a self-contained way, using both the probabilistic Brownian motion method and the analytical differential equations method.

The book begins with binomial stock price models, moves on to multistage models, then to the Cox–Ross–Rubinstein option pricing process, and then to the Black–Scholes formula. Other topics presented include Zero Coupon Bonds, forward rates, the yield curve, and several bond price models. The book continues with foreign exchange models and the Keynes Interest Rate Parity Formula, and concludes with the study of country risk, a topic not inappropriate for the times.

In addition to theoretical results, numerical models are presented in much detail. Each of the eleven chapters includes a variety of exercises.

An instructor's manual for this title is available electronically. Please send email to textbooks@ams.org for more information.

Contents: Financial Markets Binomial Trees, Replicating Portfolios, and Arbitrage ⋄ Tree Models for Stocks and Options ⋄ Using Spreadsheets to Compute Stock and Option Trees ⋄ Continuous ⋄ Models and the Black-Scholes Formula ⋄ The Analytic ⋄ Approach to Black-Scholes ⋄ Hedging ⋄ Bond Models and Interest Rate Options ⋄ Computational Methods for Bonds

2012	256 pp	Paperback
978-0-8218-9178-0		₹ 1,160.00

Mathematics of Financial Obligations

AMS

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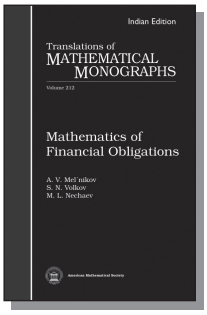

Contemporary finance and actuarial calculations have become so mathematically complex that a rigorous exposition is required for an accurate and complete presentation. This volume delivers just that. It gives a comprehensive and up-to-date methodology for financial pricing and modelling. Also included are special cases useful for practical applications. Beyond the traditional areas of hedging and investment on complete markets (the Black–Scholes and Cox–Ross–Rubinstein models), the book includes topics that are not currently available in monograph form, such as incomplete markets, markets with constraints, imperfect forms of hedging, and the convergence of calculations in finance and insurance. The book is geared toward specialists in finance and actuarial mathematics, practitioners in the financial and insurance business, students, and post-docs in corresponding areas of study. Readers should have a foundation in probability theory, random processes, and mathematical statistics.

Contents: Financial systems: Innovations and the risk calculus ◆ Random processes and the stochastic calculus ◆ Hedging and investment in complete markets ◆ Hedging and incomplete markets ◆ Markets with structural constraints and transaction costs ◆ Imperfect forms of hedging ◆ Dynamic contingent claims and American options ◆ Analysis of "bond" contingent claims ◆ Economics of insurance and finance: Convergence of quantitative methods of calculations ◆ *Bibliographical notes* ◆ *Bibliography* ◆ *Subject index*

2012	208 pp	Paperback
978-0-8218-9184-1		₹ 1,320.00

Probability Theory in Finance: A Mathematical Guide to the Black–Scholes Formula

AMS

Seán Dineen
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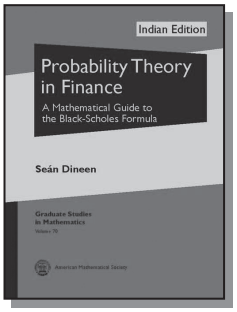

The use of the Black-Scholes model and formula is pervasive in financial markets. *There are very few undergraduate textbooks available on the subject and, until now, almost none written by mathematicians.*

Based on a course given by the author, the goal of this book is to introduce advanced undergraduates and beginning graduate students studying the mathematics of finance to the Black-Scholes formula. The author uses a first-principles approach, developing only the minimum background necessary to justify mathematical concepts and placing mathematical developments in context.

The book skillfully draws the reader toward the art of thinking mathematically and then proceeds to lay the foundations in analysis and probability theory underlying modern financial mathematics.

It rigorously reveals the mathematical secrets of topics such as abstract measure theory, conditional expectations, martingales, Wiener processes, the It calculus, and other ingredients of the Black–Scholes formula. In explaining these topics, the author uses examples drawn from the universe of finance. The book also *contains many exercises*, some included to clarify simple points of exposition, others to introduce new ideas and techniques, and a few containing relatively deep mathematical results.

With the modest prerequisite of a first course in calculus, *the book is suitable for undergraduates and graduate students in mathematics, finance, and economics* and can be read, using appropriate selections, at a number of levels.

Contents: Money and markets ◆ Fair games ◆ Set theory ◆ Measurable functions ◆ Probability spaces ◆ Expected values ◆ Continuity and integrability ◆ Conditional expectation ◆ Martingales ◆ The Black-Scholes formula ◆ Stochastic integration ◆ *Solutions* ◆ *Bibliography* ◆ *Index*

2011	312 pp	Paperback
978-0-8218-6881-2		₹ 1,325.00

Mathematical Methods

Topics in Optimal Transportation

AMS

Cédric Villani
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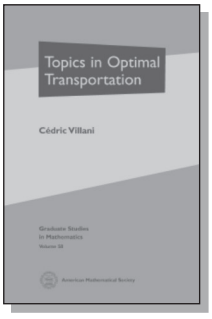

This is the first comprehensive introduction to the theory of mass transportation with its many--and sometimes unexpected--applications. In a novel approach to the subject, the book both surveys the topic and includes a chapter of problems, making it a particularly useful graduate textbook. In 1781, Gaspard Monge

defined the problem of "optimal transportation" (or the transferring of mass with the least possible amount of work), with applications to engineering in mind. In 1942, Leonid Kantorovich applied the newborn machinery of linear programming to Monge's problem, with applications to economics in mind. In 1987, Yann Brenier used optimal transportation to prove a new projection theorem on the set of measure preserving maps, with applications to fluid mechanics in mind. Each of these contributions marked the beginning of a whole mathematical theory, with many unexpected ramifications. Nowadays, the Monge-Kantorovich problem is used and studied by researchers from extremely diverse horizons, including probability theory, functional analysis, isoperimetry, partial differential equations, and even meteorology. Originating from a graduate course, the present volume is intended for graduate students and researchers, covering both theory and applications. Readers are only assumed to be familiar with the basics of measure theory and functional analysis.

Contents: Introduction ◆ The Kantorovich duality ◆ Geometry of optimal transportation ◆ Brenier's polar factorization theorem ◆ The Monge-Ampère equation ◆ Displacement interpolation and displacement convexity ◆ Geometric and Gaussian inequalities ◆ The metric side of optimal transportation ◆ A differential point of view on optimal transportation ◆ Entropy production and transportation inequalities ◆ *Problems* ◆ *Bibliography* ◆ *Table of short statements* ◆ *Index*

2016	**392 pp**	**Paperback**
978-1-4704-2562-3		**₹ 1,600.00**

Mathematical Modelling

Mathematical Modelling: A Case Studies Approach

AMS

Reinhard Illner
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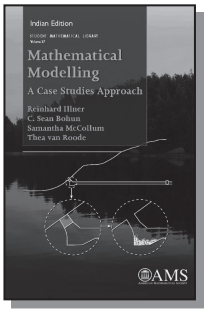

Mathematical Modelling is a subject without boundaries. It is the means by which mathematics becomes useful to virtually any subject. Moreover, modelling has been and continues to be a driving force for the development of mathematics itself. *This book explains the process of modelling real situations to obtain mathematical problems that can be analyzed, thus solving the original problem. The presentation is in the form of case studies, which are developed much as they would be in true applications.* In many cases, an initial model is created, then modified along the way. Some cases are familiar, such as the evaluation of an annuity. Others are unique, such as the fascinating situation in which an engineer, armed only with a slide rule, had 24 hours to compute whether a valve would hold when a temporary rock plug was removed from a water tunnel. *Each chapter ends with a set of exercises and some suggestions for class projects.* Some projects are extensive, as with the explorations of the predator-prey model; others are more modest. The text was designed to be suitable for a one-term course for advanced undergraduates. The selection of topics and the style of exposition reflect this choice. The authors have also succeeded in demonstrating just how enjoyable the subject can be. *This is an ideal text for classes on modelling. It can also be used in seminars or as preparation for mathematical modelling competitions.*

Contents: Crystallization dynamics ◆ Will the valve hold? ◆ How much will that annuity cost me? ◆ Dimensional analysis ◆ Predator-prey systems ◆ A control problem in fishery management ◆ Formal justice ◆ Traffic dynamics: A microscopic

model ⋄ Traffic dynamics: Macroscopic modelling ⋄ *Bibliography*

2011	216 pp	Paperback
978–0–8218–6891–1		₹ 1,020.00

Partial Differential Equations: Modeling, Analysis, Computation

Mattheij R M M, Rienstra S W, ten Thije Boonkkamp J H M
Technische Universiteit Eindhoven, The Netherlands

See page 64

Mathematical Physics

Mathematical Physics: Advanced Topics

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This is the companion volume to *Mathematical Physics: The Basics*, which covers topics like vectors, tensors, Cartesian coordinates, Lorentz tensors, curvilinear coordinates, linear vector spaces, linear operators, matrices, complex variables and their applications. It covers more advanced topics taught in the second/third semester which include ODE, gamma and beta functions, Bessel functions, spherical harmonics and special functions, partial differential equations, generalised functions, and group theory. *Together, the two volumes cover the subject of mathematical physics for a PG course in physical sciences.*

Contents: *Preface* ⋄ Ordinary Differential Equations ⋄ Gamma (Factorial) and Beta Functions ⋄ Bessel Functions ⋄ Some Special Functions and Spherical Harmonics ⋄ Partial Differential Equations ⋄ Generalized Functions, the Dirac Delta Function and the Fourier Transform ⋄ Group Theory ⋄ *Appendix* ⋄ *References* ⋄ *Index*

Distributed worldwide by CRC Press LLC, USA, Taylor and Francis Group, except in India, Pakistan, Bangladesh, Sri Lanka, Nepal and Bhutan.

2006	264 pp	Paperback
978–81–7371–560–0		₹ 695.00

Problems and Solutions: International Olympiads on Astronomy and Astrophysics

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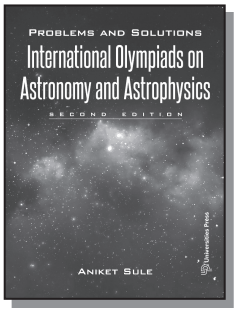
Academic Coordinator, Indian Astronomy Olympiad Programme; Regional Coordinator (Asia–Pacific), International Olympiads on Astronomy and Astrophysics; Reader, Homi Bhabha Centre for Science Education, Tata Institute of Fundamental Research, Mumbai, India



The International Olympiads on Astronomy and Astrophysics (IOAA) are competitions where teams of high-school students from around the world compete in a series of tests and are awarded medals based on their performance. Started in 2007, more than 45 countries have participated in these olympiads. The competition comprises three rounds: theoretical problems, data analysis problems and night sky observation tests. This book presents problems from all the eight IOAAs held thus far. The problems are categorised according to the concepts involved and also graded according to the difficulty level. Solutions to all the problems are provided. Additional notes help make the solutions self-explanatory.

Salient Features

- Presents problems and solutions from all eight olympiads held thus far
- Problems arranged based on topic and level of difficulty
- Non-calculus based approach, making it accessible to high-school students
- Numerical values use the SI system of units wherever applicable
- For problems with multiple solutions, all the solutions are provided
- Includes current syllabus of IOAA

Contents: *Preface* ⋄ *Acknowledgments* ⋄ *Academic Committees of Previous IOAAs* ⋄ *President's Message*

◆ *A Note about the Problems* ◆ *Table of Constants* ◆ Celestial Mechanics ◆ Celestial Coordinate Systems ◆ Geometric Astronomy and Time ◆ Optics and Detectors ◆ Physics of Stars and Planets ◆ Stellar Observations ◆ Binaries and Variables ◆ Galactic Astrophysics ◆ Extragalactic Astrophysics ◆ Night Sky Observation ◆ Solutions: Celestial Mechanics ◆ Solutions: Celestial Coordinate Systems ◆ Solutions: Geometric Astronomy and Time ◆ Solutions: Optics and Detectors ◆ Solutions: Physics of Stars and Planets ◆ Solutions: Stellar Observations ◆ Solutions: Binaries and Variables ◆ Solutions: Galactic Astrophysics ◆ Solutions: Extragalactic Astrophysics ◆ Solutions: Night Sky Observation ◆ *Appendix: Syllabus of IOAA*

2015	304 pp	Paperback
978-81-7371-980-6		₹ 975.00

Measure Theory

Introduction to Measure Theory, An

AMS

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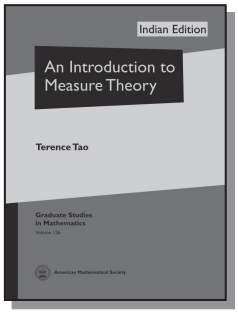


This is a graduate text introducing the fundamentals of measure theory and integration theory, which is the foundation of modern real analysis. The text focuses first on the concrete setting of Lebesgue measure and the Lebesgue integral (which in turn is motivated by the more classical concepts of Jordan measure and the Riemann integral), before moving on to abstract measure and integration theory, including the standard convergence theorems, Fubini's theorem, and the Carathéodory extension theorem. Classical differentiation theorems, such as the Lebesgue and Rademacher differentiation theorems, are also covered, as are connections with probability theory. *The material is intended to cover a quarter or semester's worth of material for a first graduate course in real analysis.*

There is an emphasis in the text on tying together the abstract and the concrete sides of the subject, using the latter to illustrate and motivate the former. The central role of key principles (such as Littlewood's three principles) as providing guiding intuition to the subject is also emphasized. There are a large number of exercises throughout that develop key aspects of the theory, and are thus an integral component of the text.

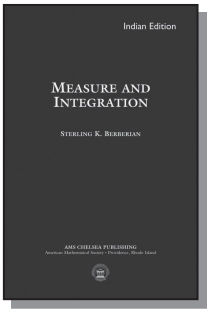
As a supplementary section, a discussion of general problem-solving strategies in analysis is also given. The last three sections discuss optional topics related to the main matter of the book.

2013	224 pp	Paperback
978-1-4704-0922-7		₹ 1,100.00

Measure and Integration

AMS

Sterling K Berberian



This highly flexible text is organized into two parts: Part I is suitable for a one-semester course at the first-year graduate level, and the book as a whole is suitable for a full-year course.

Part I treats the theory of measure and integration over abstract measure spaces. Prerequisites are a familiarity with epsilon-delta arguments and with the language of naive set theory (union, intersection, function). The fundamental theorems of the subject are derived from first principles, with details in full. Highlights include convergence theorems (monotone, dominated), completeness of classical function spaces (Riesz-Fischer theorem), product measures (Fubini's theorem), and signed measures (Radon-Nikodym theorem).

Part II is more specialized; it includes regular measures on locally compact spaces, the Riesz-Markoff theorem on the measure-theoretic representation of positive linear forms, and Haar

measure on a locally compact group. The group algebra of a locally compact group is constructed in the last chapter, by an especially transparent method that minimizes measure-theoretic difficulties. Prerequisites for Part II include Part I plus a course in general topology.

To quote from the Preface: "Finally, I am under no illusions as to originality, for the subject of measure theory is an old one which has been worked over by many experts. My contribution can only be in selection, arrangement, and emphasis. I am deeply indebted to Paul R. Halmos, from whose textbook I first studied measure theory; I hope that these pages may reflect their debt to his book without seeming to be almost everywhere equal to it."

Contents: Measures ⋄ Measurable functions ⋄ Sequences of measurable functions ⋄ Integrable functions ⋄ Convergence theorems ⋄ Product measures ⋄ Finite signed measures ⋄ Integration over locally compact spaces ⋄ Integration over locally compact groups ⋄ *References and notes* ⋄ *Bibliography* ⋄ *Index*

2013	**336 pp**	**Paperback**
978-1-4704-0919-7		**₹ 1,525.00**

Measure Theory

J L Doob

This book is different from other books on measure theory in that it accepts probability theory as an essential part of measure theory. This means that many examples are taken from probability; that probabilistic concepts such as independence, Markov processes, and conditional expectations are integrated into the text rather than being relegate to an appendix; that more attention is paid to the role of algebras than is customary; and that the metric defining the distance between sets as the measure of their symmetric difference is exploited more than is customary.

2010	**232 pp**	**Paperback**
978-81-8489-615-2		**₹ 870.00**

Measure Theory and Integration

AMS

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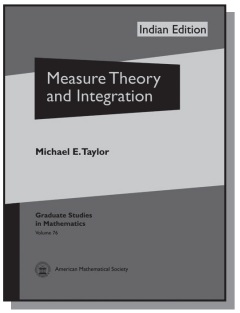


This self-contained treatment of measure and integration begins with a brief review of the Riemann integral and proceeds to a construction of Lebesgue measure on the real line. From there the reader is led to the general notion of measure, to the construction of the Lebesgue integral on a measure space, and to the major limit theorems, such as the Monotone and Dominated Convergence Theorems. The treatment proceeds to Lp spaces, normed linear spaces that are shown to be complete (i.e., Banach spaces) due to the limit theorems. Particular attention is paid to L2 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 ⋄ Lp spaces ⋄ The Caratheodory construction of measures ⋄ Product measures ⋄ Lebesgue measure on Rn and on manifolds ⋄ Signed measures

and complex measures Lp 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 ◆ *Appendix A: Metric spaces, topological spaces, and compactness* ◆ *Appendix B: Derivatives, diffeomorphisms, and manifolds* ◆ *Appendix C: The Whitney Extension Theorem* ◆ *Appendix D: The Marcinkiewicz Interpolation Theorem* ◆ *Appendix E: Sard's Theorem* ◆ *Appendix F: A change of variable theorem for many-to-one maps* ◆ *Appendix G: Integration of differential forms* ◆ *Appendix H: Change of variables revisited* ◆ *Appendix I: The Gauss-Green formula on Lipschitz domains* ◆ *Bibliography* ◆ *Symbol index* ◆ *Subject index*

2012	336 pp	Paperback
978-0-8218-8718-9		₹ 1,270.00

Modern Theory of Integration, A

AMS

Robert G Bartle
Eastern Michigan University, Ypsilanti; University of Illinois at Urbana–Champaign, USA

The theory of integration is one of the twin pillars on which analysis is built. The first version of integration that students see is the Riemann integral. Later, graduate students learn that the Lebesgue integral is "better" because it removes some restrictions on the integrands and the domains over which we integrate. However, there are still drawbacks to Lebesgue integration, for instance, dealing with the Fundamental Theorem of Calculus, or with "improper" integrals.

This book is an introduction to a relatively new theory of the integral (called the "generalized Riemann integral" or the "Henstock-Kurzweil integral") that corrects the defects in the classical Riemann theory and both simplifies and extends the Lebesgue theory of integration. Although this integral includes that of Lebesgue, its definition is very close to the Riemann integral that is familiar to students from calculus. One virtue of the new approach is that no measure theory and virtually no topology is required. Indeed, the book includes a study of measure theory as an application of the integral.

Part 1 fully develops the theory of the integral of functions defined on a compact interval. This restriction on the domain is not necessary, but it is the case of most interest and does not exhibit some of the technical problems that can impede the reader's understanding.

Part 2 shows how this theory extends to functions defined on the whole real line. The theory of Lebesgue measure from the integral is then developed, and the author makes a connection with some of the traditional approaches to the Lebesgue integral. Thus, readers are given full exposure to the main classical results.

The text is suitable for a first-year graduate course, although much of it can be readily mastered by advanced undergraduate students. Included are many examples and a very rich collection of exercises. There are partial solutions to approximately one-third of the exercises. A complete solutions manual is available separately.

Contents: Integration on compact intervals ◆ Gauges and integrals ◆ Some examples ◆ Basic properties of the integral ◆ The fundamental theorems of calculus ◆ The Saks-Henstock lemma ◆ Measurable functions ◆ Absolute integrability ◆ Convergence theorems ◆ Integrability and mean convergence ◆ Measure, measurability, and multipliers ◆ Modes of convergence ◆ Applications to calculus ◆ Substitution theorems ◆ Absolute continuity ◆ Integration on infinite intervals ◆ Introduction to Part 2 ◆ Infinite intervals ◆ Further re-examination ◆ Measurable sets ◆ Measurable functions ◆ Sequences of functions ◆ Limits superior and inferior ◆ Unbounded sets and sequences ◆ The arctangent lemma ◆ Outer measure ◆ Lebesgue's differentiation theorem ◆ Vector spaces ◆ Semimetric spaces ◆ Riemann-Stieltjes integral ◆ Normed linear spaces ◆ Some partial solutions ◆ *References* ◆ *Index* ◆ *Symbol index*

2010	472 pp	Paperback
978-0-8218-5215-6		₹ 1,855.00

Solutions Manual to a Modern Theory of Integration

AMS

2010	80 pp	Paperback
978-0-8218-5216-3		₹ 955.00

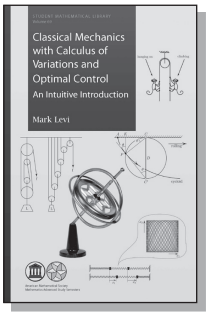
Mechanics

Classical Mechanics with Calculus of Variations and Optimal Control: An Intuitive Introduction

AMS

Print on Demand

Mark Levi
Pennsylvania State University, University Park, USA



This is an intuitively motivated presentation of many topics in classical mechanics and related areas of control theory and calculus of variations. All topics throughout the book are treated with tolerance for unraveling definitions and for proofs which leave the reader in the dark. Some areas of particular interest are an extremely short derivation of the ellipticity of planetary orbits; a statement and an explanation of the 'tennis racket paradox'; a heuristic explanation (and a rigorous treatment) of the gyroscopic effect; a revealing equivalence between the dynamics of a particle and statics of a spring; a short geometrical explanation of pontryagin's maximum principle, and more. In the last chapter, aimed at more advanced readers, the Hamiltonian and momentum are compared to forces in a certain static problem. This gives a palpable physical meaning to some seemingly abstract concepts and theorems. With minimal prerequisites consisting of basic calculus and basic undergraduate physics, this book is suitable for courses from an undergraduate to a beginning graduate level, and for a mixed audience of mathematics, physics and engineering students. Much of the enjoyment of the subject lies in solving almost 200 problems in this book.

Contents: *Series Foreword: MASS and REU at Penn State University* ◆ *Preface* ◆ Chapter 1. One Degree of Freedom 1 ◆ The setup ◆ Equations of motion ◆ Potential energy ◆ Kinetic energy ◆ Conservation of total energy ◆ The phase plane ◆ Lagrangian equations of motion ◆ The variational meaning of the Euler–Lagrange equation ◆ Euler–Lagrange equations — general theory ◆ Noether's theorem/ Energy conservation ◆ Hamiltonian equations of motion ◆ The phase flow ◆ The divergence ◆ A lemma on moving domains ◆ Divergence as a measure of expansion ◆ Liouville's theorem ◆ The "uncertainty principle" of classical mechanics ◆ Can one hear the shape of the potential? ◆ A dynamics-statics equivalence ◆ Chapter summary ◆ Problems ◆ Chapter 2. More Degrees of Freedom ◆ Newton's laws 2. Center of mass ◆ Newton's second law for multi-particle systems ◆ Angular momentum, torque ◆ Rotational version of Newton's second law; conservation of the angular momentum ◆ Circular motion: angular position, velocity, acceleration ◆ Energy and angular momentum of rotation ◆ The rotational – translational analogy ◆ Potential force fields ◆ Some physical remarks ◆ Conservation of energy ◆ Central force fields; conservation of angular momentum ◆ Kepler's problem ◆ Kepler's trajectories are conics: a short proof ◆ Motion in linear central fields ◆ Linear vibrations: derivation of the equations ◆ A nonholonomic system ◆ The modal decomposition of vibrations ◆ Lissajous' figures and Chebyshev's polynomials ◆ Invariant 2-tori in R4 ◆ Rayleigh's quotient and a physical interpretation ◆ The Coriolis and the centrifugal forces ◆ Miscellaneous examples ◆ Problems ◆ Chapter 3. Rigid Body Motion ◆ Reference frames, angular velocity ◆ The tensor of inertia ◆ The kinetic energy ◆ Dynamics in the body frame ◆ Euler's equations of motion ◆ The tennis racket paradox ◆ Poinsot's description of free rigid body motion ◆ The gyroscopic effect — an intuitive explanation ◆ The gyroscopic torque ◆ Speed of precession ◆ The gyrocompass ◆ Problems ◆ Chapter 4. Variational Principles of Mechanics ◆ The setting ◆ Lagrange's equations ◆ Examples ◆ Hamilton's principle ◆ Hamilton's principle ⇔ Euler–Lagrange equations ◆ Advantages of Hamilton's principle ◆ Maupertuis' principle — some history ◆ Maupertuis' principle on an example ◆ Maupertuis' principle — a more general statement ◆ Discussion of the Maupertuis principle ◆ Problems ◆ Chapter 5. Classical Problems of Calculus of Variations ◆ Introduction and an overview ◆ Dido's problem — a historical note ◆ A special class of Lagrangians ◆ The shortest way to the smallest integral ◆ The brachistochrone problem ◆ Johann Bernoulli's solution of the brachistochrone problem ◆ Geodesics in Poincare's metric ◆ The soap film, or the minimal

surface of revolution ◆ The catenary: formulating the problem ◆ Minimizing with constraints — Lagrange multipliers ◆ Catenary — the solution ◆ An elementary solution for the catenary ◆ Problems Chapter ◆ The Conditions of Legendre and Jacobi for a Minimum ◆ Conjugate points ◆ The Legendre and the Jacobi conditions ◆ Quadratic functionals: the fundamental theorem ◆ Sufficient conditions for a minimum for a general functional ◆ Necessity of the Legendre condition for a minimum ◆ Necessity of the Jacobi condition for a minimum ◆ Some intuition on positivity of functionals ◆ Problems ◆ Chapter 7. Optimal Control ◆ Formulation of the problem ◆ The Maximum Principle ◆ A geometrical explanation of the Maximum Principle ◆ Example 1: a smooth landing 5. Example 2: stopping a harmonic oscillator ◆ Huygens's principle vs. Maximum Principle ◆ Background on linearized and adjoint equations ◆ Problems ◆ Chapter 8. Heuristic Foundations of Hamiltonian Mechanics ◆ Some fundamental questions ◆ The main idea ◆ The Legendre transform, the Hamiltonian, the momentum ◆ Properties of the Legendre transform ◆ The Hamilton–Jacobi equation ◆ Noether's theorem ◆ Conservation of energy ◆ Poincaré's integral invariants ◆ The generating function ◆ Hamilton's equations ◆ Hamiltonian mechanics as the "spring theory" ◆ The optical-mechanical analogy ◆ Hamilton–Jacobi equation leading to the Schrödinger equation ◆ Examples and Problems ◆ *Bibliography* ◆ *Index*

2016	300 pp	Paperback
978–1–4704–2598–2		₹ 1,160.00

Foundations of Mechanics (Second Edition)

AMS

Ralph Abraham
Department of Mathematics, University of California, Santa Cruz, USA

Jerrold E Marsden
Applied Mathematician and Carl F. Braun Professor of Engineering and Control and Dynamical Systems, California Institute of Technology, Pasadena, USA

For many years, this book has been viewed as a classic treatment of geometric mechanics. It is known for its broad exposition of the subject, with many features that cannot be found elsewhere. *The book is recommended as a textbook and as a basic reference work for the foundations of differentiable and Hamiltonian dynamics.*

Contents: *Part 1:* Preliminaries—Differential Theory ◆ Calculus on Manifolds

Part 2: Analytical Dynamics—Hamiltonian and Lagrangian Systems ◆ Hamiltonian Systems with Symmetry ◆ Hamiltonian-Jacobi Theory and Mathematical Physics

Part 3: An outline of Qualitative Dynamics—Topological Dynamics ◆ Differentiable Dynamics ◆ Hamiltonian Dynamics

Part 4: Celestial Mechanics—The Two-Body Problem ◆ The Three-Body Problem ◆ *Appendix* ◆ *Bibliography* ◆ *Index* ◆ *Glossary of Symbols* ◆ *Errata*

2011	852 pp	Paperback
978–0–8218–6875–1		₹ 2,770.00

Number Theory

1001 Problems in Classical Number Theory

AMS

Jean–Marie De Koninck
Université Laval, Quebec, Canada

Armel Mercier
Université du Québec à Chicoutimi, Canada

In the spirit of *The Book of the One Thousand and One Nights*, the authors offer 1001 problems in number theory in a way that entices the reader to immediately attack the next problem. *Whether a novice or an experienced mathematician, anyone fascinated by numbers will find a great variety of problems—some simple, others more complex—that will provide them with a wonderful mathematical experience.*

Contents: *Part 1:* Key Elements from the Theory—Notations ◆ Some Classical Forms of Argument ◆ Inequalities ◆ Divisibility ◆ Prime Numbers ◆ Congruences ◆ The Function [x] ◆ Arithmetical Functions ◆ Diophantine Equations ◆ Quadratic Reciprocity ◆ Continued Fractions ◆ Classification of Real Numbers ◆ Two Conjectures ◆ *Part 2:* Statements of the Problems—Mathematical Induction and Combinatorics ◆ Divisibility ◆ Prime Numbers ◆ Representation of Numbers ◆ Congruences ◆ Primality Tests and Factorization Algorithms ◆ Integer Parts ◆ Arithmetical Functions ◆ Solving Equations Involving Arithmetical Functions ◆ Special Numbers ◆ Diophantine Equations ◆ Quadratic Reciprocity ◆ Continued Fractions ◆ Classification

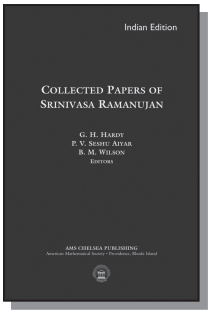
of Real Numbers ◆ *Part 3:* Solutions—Bibliography ◆ *Subject Index* ◆ *Index of Authors*

2011	352 pp	Paperback
978-0-8218-6888-1		₹1,590.00

Collected Papers of Srinivasa Ramanujan

AMS

G H Hardy, P V Seshu Aiyar & B M Wilson



The influence of Ramanujan on number theory is without parallel in mathematics. His papers, problems, and letters have spawned a remarkable number of later results by many different mathematicians. Here, his 37 published papers, most of his first two and last letters to Hardy, the famous 58 problems submitted to the Journal of the Indian Mathematical Society, and the commentary of the original editors (Hardy, Seshu Aiyar and Wilson) are reprinted again, after having been unavailable for some time.

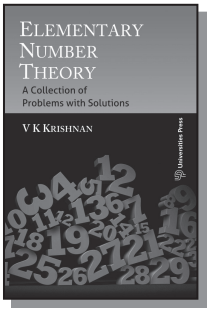
In this printing of Ramanujan's collected papers, Bruce Berndt provides an annotated guide to Ramanujan's work and to the mathematics it inspired over the last three-quarters of a century. The historical development of ideas is traced in the commentary and by citations to the copious references. The editor has done the mathematical world a tremendous service that few others would be qualified to do.

Contents: Some properties of Bernoulli's numbers ◆ On Question 330 of Prof. Sanjana ◆ Note on a set of simultaneous equations Irregular numbers ◆ Squaring the circle ◆ Modular equations and approximations to Π ◆ On the integral ∫ x0tan−1t/t dt ◆ On the number of divisors of a number On the sum of the square roots of the first n natural numbers ◆ On the product Π n=∞n=0[1+(x/a+nd)3] ◆ Some definite integrals ◆ Some definite integrals connected with Gauss's sums ◆ Summation of a certain series ◆ New expressions for Riemann's functions ξ (s) and Ξ(t) Highly composite numbers ◆ On certain infinite series ◆ Some formula in the analytic theory of numbers ◆ On certain arithmetical functions ◆ A series for Euler's constant γ ◆ On the expression of a number in the form $ax^2+by^2+cz^2+du^2$ ◆ On certain trigonometrical sums and their applications in the theory of numbers ◆ Some definite integrals ◆ A proof of Bertrand's postulate ◆ Some properties of p(n), the number of partitions of n ◆ Proof of certain identities in combinatory analysis ◆ A class of definite integrals ◆ Congruence properties of partitions ◆ Algebraic relations between certain infinite products ◆ Congruence properties of partitions ◆ Une formule asymptotique pour le nombre des partitions de n ◆ Proof that almost all numbers n are composed of about log log n prime factors ◆ Asymptotic formulae in combinatory analysis ◆ Asymptotic formulae for the distribution of integers of various types ◆ The normal number of prime factors of a number n ◆ Asymptotic formulae in combinatory analysis ◆ On the coefficients in the expansions of certain modular functions ◆ Questions and solutions ◆ *Appendix I: Notes on the papers* ◆ *Appendix II: Further extracts from Ramanujan's letters to G. H. Hardy* ◆ *Commentary on Ramanujan's collected papers*

2013	464 pp	Paperback
978-1-4704-0918-0		₹1,545.00

Elementary Number Theory: A Collection of Problems with Solutions

V K Krishnan
Formerly Professor of Mathematics, St. Thomas College, Thrissur, India



This book gives a brief introduction to elementary number theory and includes a collection of three hundred problems and their solutions. Number theory deals with the properties of integers.

The most interesting and important property of integers is that of divisibility and congruence.

This is primarily a problem book aimed at school students preparing for talent tests like the mathematical Olympiads. Most of the problems are chosen from question papers of the regional, national and international mathematical Olympiads and the talent tests conducted by the Association of Mathematics Teachers of India. Some are taken from standard textbooks, and some are new.

Undergraduate students keen to learn elementary number theory through interesting problems will find the book a good resource. *The book is suitable for self-study since the proofs of theorems and solutions to problems are given in detail.*

Contents: *Preface* ◆ Basic Properties of Integers ◆ Divisibility ◆ Primes ◆ The greatest common divisor and least common multiple ◆ The binomial coefficients ◆ Linear Diophantine equations ◆ Congruences ◆ Residue systems ◆ Linear congruences ◆ Lagrange's Theorem ◆ Fermat's Theorem ◆ Pseudoprimes and Carmichael numbers ◆ Number-theoretic functions ◆ Euler's function ◆ Divisor functions ◆ The greatest integer function ◆ Quadratic Residues ◆ Primitive Roots ◆ Miscellaneous ◆ Pythagorean triples ◆ *Problems* ◆ Set I, II, III, IV, V, VI, VII, VIII, IX, X ◆ *Solutions* ◆ Set I, II, III, IV, V, VI, VII, VIII, IX, X ◆ *Index*

2012	260 pp	Paperback
978–81–7371–743–7		₹ 955.00

First Steps in Number Theory: A Primer on Divisibility

Shailesh A Shirali
Principal, Sahyadri School KFI Tiwai Hill, Gundalwadi Rajgurunagar Taluka, Pune, India

This book deals with tests of divisibility and the rich theory behind them. Along the way, the reader will study a subject called Number Theory. To study this book, all that is required is familiarity with elementary arithmetic and algebra (addition and subtraction of algebraic expressions, the laws of exponents, the idea of prime factorization of an integer, the notion of relative primeness of two integers, etc.); *in short, material which would normally be covered in grades 7–9 in most countries. Plenty of exercises are scattered throughout the book, with solutions at the end.*

2000	200 pp	Paperback
978–81–7371–368–2		₹ 835.00

Introduction to Analytic Number Theory

Tom M Apostol

This introductory textbook is designed to teach undergraduates the basic ideas and techniques of number theory, with special consideration to the principles of analytic number theory. The first five chapters treat elementary concepts such as divisibility, congruence and arithmetical functions. The topics in the next chapters include Dirichlet's theorem on primes in progressions, Gauss sums, quadratic residues, Dirichlet series, and Euler products with applications to the Riemann zeta function and Dirichlet L-functions. Also included is an introduction to partitions. Among the strong points of the book are its clarity of exposition and a collection of exercises at the end of each chapter. The first ten chapters, with the exception of one section, are accessible to anyone with a knowledge of elementary calculus; the last four chapters require some knowledge of complex function theory including complex integration and residue calculus.

2010	352 pp	Paperback
978–81–8489–521–6		₹ 1,080.00

Number Theory

AMS

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To observe the tenth anniversary of the founding of the Ramanujan Mathematical Society, an international conference on Discrete Mathematics and Number Theory was held in January 1996 in Tiruchirapalli, India. *This volume contains the proceedings from the number theory component of that conference. Papers are divided into four groups: arithmetic algebraic geometry, automorphic forms, elementary and analytic number theory and transcendental number theory.* This work deals with recent progress in current aspects of number theory and covers a

wide variety of topics.

Contents: Integration on compact intervals ◆ Gauges and integrals ◆ Some examples ◆ Basic properties of the integral ◆ The fundamental theorems of calculus ◆ The Saks-Henstock lemma ◆ Measurable functions ◆ Absolute integrability ◆ Convergence theorems ◆ Integrability and mean convergence ◆ Measure, measurability, and multipliers ◆ Modes of convergence ◆ Applications to calculus ◆ Substitution theorems ◆ Absolute continuity ◆ Integration on infinite intervals ◆ Introduction to Part 2 ◆ Infinite intervals ◆ Further re-examination ◆ Measurable sets ◆ Measurable functions ◆ Sequences of functions ◆ Limits superior and inferior ◆ Unbounded sets and sequences ◆ The arctangent lemma ◆ Outer measure ◆ Lebesgue's differentiation theorem ◆ Vector spaces ◆ Semimetric spaces ◆ Riemann-Stieltjes integral ◆ Normed linear spaces ◆ Some partial solutions ◆ *References* ◆ *Index* ◆ *Symbol index*

2009	**408 pp**	**Paperback**
978–0–8218–4861–6		**₹ 1,315.00**

Number Theory

Shailesh A Shirali
Principal, Sahyadri School KFI Tiwai Hill, Gundalwadi Rajgurunagar Taluka, Pune, India

C S Yogananda

Number theory has fascinated mathematicians from the most ancient of times. *A remarkable feature of number theory is the fact that there is something in it for everyone, from puzzle enthusiasts, problem solvers and amateur mathematicians to professional scientists and technologists*. The articles included form a varied lot, beginning with a puzzle, 'find four positive integers such that the sum of any two is a square', to an expository article on one of the great mathematical achievements of the 20th century, the proof of 'Fermat's Last Theorem'.

Contents: *Foreword* ◆ *Preface* ◆ On Provability versus Consistency in Elementary Mathematics ◆ To find Four Distinct Positive Integers such that the Sum of Any Two of them is a Square ◆ Bachet's Problems* Mathematical Induction ◆ An Impresario of the Infinite* On the Infinitude of Prime Numbers ◆ Euler's Proof ◆ On Fermat's Two Squares Theorem ◆ Fermat's Two Squares Theorem Revisited ◆ Factoring Fermat Numbers ◆ A Unique Computational Experiment for Factoring F9 ◆ The Class Number Problem ◆ Binary Quadratic Forms* The Class Number Problem ◆ An Introduction to Algebraic Number Theory ◆ Roots are Not Contained in Cyclotomic Fields ◆ Die ganzen Zahlen hat Gott gemacht ◆ Polynomials with Integer Values ◆ Prime Representing Quadratics ◆ The Congruent Number Problem ◆ Fermat's Last Theorem ◆ A Theorem at Last! ◆ Some Unsolved Problems in Number Theory ◆ Progress Made in Recent Times ◆ When and Where the Articles Appeared in Resonance ◆ *Index*

2003	**112 pp**	**Paperback**
978–81–7371–454–2		**₹ 495.00**

Number Theory 2: Introduction to Class Field Theory

AMS

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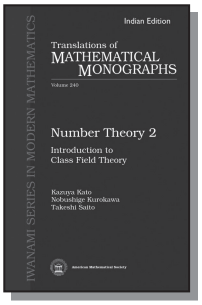
University of Chicago, Chicago, IL

Nobushige Kurokawa
Tokyo Institute of Technology, Tokyo, Japan

Takeshi Saito
University of Tokyo, Tokyo, Japan



This book, the second of three related volumes on number theory, is the English translation of the original Japanese book. Here, the idea of class field theory, a highlight in algebraic number theory, is first described with many concrete examples. A detailed account of proofs is thoroughly exposited in the final chapter. The authors also explain the local–global method in number theory, including the use of ideles and adeles. Basic properties of zeta and L-functions are established and used to prove the prime number theorem and the Dirichlet theorem on prime numbers in arithmetic progressions. With this book, the reader can enjoy the beauty of numbers and obtain fundamental knowledge of modern number theory.

The translation of the first volume was published as Number Theory 1: Fermat's Dream, Translations

of Mathematical Monographs (Iwanami Series in Modern Mathematics), Vol. 186, American Mathematical Society, 2000.

2017	**256 pp**	**Paperback**
978-1-4704-3736-7		**₹ 1,600.00**

Number Theory 3

AMS

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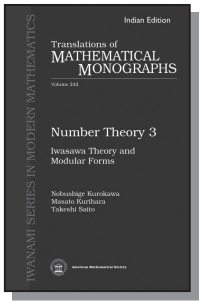
Keio University, Yokohama, Japan

Takeshi Saito
University of Tokyo, Tokyo, Japan



This is the third of three related volumes on number theory. (The first two volumes were also published in the Iwanami Series in Modern Mathematics, as volumes 186 and 240.) The two main topics of this book are Iwasawa theory and modular forms. The presentation of the theory of modular forms starts with several beautiful relations discovered by Ramanujan and leads to a discussion of several important ingredients, including the zeta-regularised products, Kronecker's limit formula, and the Selberg trace formula. The presentation of Iwasawa theory focuses on the Iwasawa main conjecture, which establishes far-reaching relations between a p-adic analytic zeta function and a determinant defined from a Galois action on some ideal class groups. This book also contains a short exposition on the arithmetic of elliptic curves and the proof of Fermat's last theorem by Wiles.

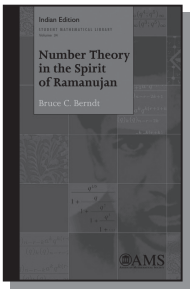
Together with the first two volumes, this book is a good resource for anyone learning or teaching modern algebraic number theory.

2017	**240 pp**	**Paperback**
978-1-4704-3738-1		**₹ 1,525.00**

Number Theory in the Spirit of Ramanujan

AMS

Bruce C Berndt
University of Illinois at Urbana-Champaign, USA



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 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*

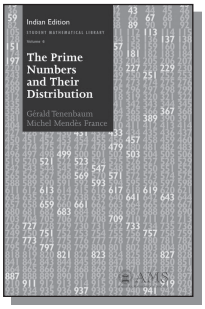
2012	208 pp	Paperback
978-0-8218-8731-8		₹ 1,100.00

Prime Numbers and Their Distribution, The

AMS

Gérald Tenenbaum
Université Henri Poincaré, Nancy I, France

Michel Mendès France
Université Bordeaux I, France



We have been curious about numbers—and prime numbers—since antiquity. One notable new direction this century in the study of primes has been the influx of ideas from probability. The goal of this book is to provide insights into the prime numbers and to describe how a sequence so tautly determined can incorporate such a striking amount of randomness.

There are two ways in which the book is exceptional. First, some familiar topics are covered with refreshing insight and/or from new points of view. Second, interesting recent developments and ideas are presented that shed new light on the prime numbers and their distribution among the rest of the integers.

The book begins with a chapter covering some classic topics, such as quadratic residues and the Sieve of Eratosthenes. Also discussed are other sieves, primes in cryptography, twin primes, and more.

Two separate chapters address the asymptotic distribution of prime numbers. In the first of these, the familiar link between(s) and the distribution of primes is covered with remarkable efficiency and intuition. The later chapter presents a walk through an elementary proof of the Prime Number Theorem. To help the novice understand the "why" of the proof, connections are made along the way with more familiar results such as Stirling's formula.

A most distinctive chapter covers the stochastic properties of prime numbers. The authors present a wonderfully clever interpretation of primes in arithmetic progressions as a phenomenon in probability. They also describe Cramér's model, which provides a probabilistic intuition for formulating conjectures that have a habit of being true. In this context, they address interesting questions about equipartition modulo 1 for sequences involving prime numbers. The final section of the chapter compares geometric visualizations of random sequences with the visualizations for similar sequences derived from the primes. The resulting pictures are striking and illuminating. The book concludes with a chapter on the outstanding big conjectures about prime numbers.

This book is suitable for anyone who has had a little number theory and some advanced calculus involving estimates. Its engaging style and invigorating point of view will make refreshing reading for advanced undergraduates through research mathematicians. This book is the English translation of the French edition.

Contents: Genesis: From Euclid to Chebyshev ◆ The Riemann zeta function ◆ Stochastic distribution of prime numbers ◆ An elementary proof of the prime number theorem ◆ The major conjectures ◆ *Further reading*

2014	136 pp	Paperback
978-1-4704-1917-2		₹ 1,320.00

Short Stories About Numbers

Rajnish Kumar
Deputy Chief Mechanical Engineer, Indian Railways

Why is 11 eleven and not oneteen, and 12 twelve and not twoteen? Why of all bases, has this strange number 2.718… been chosen as the natural logarithm base called *e*? Why does the computer use such a strange notation as F29 to denote 3881? These are questions that may have arisen in the curious minds of young learners. *Here, by answering a few of these questions, the author brings out the innately fascinating quality of mathematics and*

its astonishing ability to explain many mysterious phenomena of nature. The material for this book has been collected by the author over years of adventuring in mathematics, motivated only by his love and passion for numbers and with the hope that it will serve as a friendly encouraging guiding post for other young adventurers.

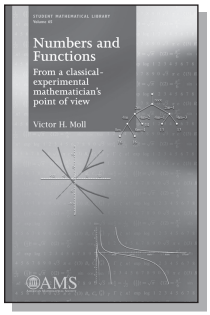
2010	200 pp	Paperback
978–81–7371–698–0		₹ 835.00

Number Theory and Combinatorics

Numbers and Functions: From a Classical–Experimental Mathematician's Point of View

AMS

Victor H Moll
Tulane University, New Orleans, USA



New mathematics often comes about by probing what is already known. Mathematicians will change the parameters in a familiar calculation or explore the essential ingredients of a classic proof. Almost magically, new ideas emerge from this process. This book examines elementary functions, such as those encountered in calculus courses, from this point of view of experimental mathematics. The focus is on exploring the connections between these functions and topics in number theory and combinatorics. There is also an emphasis throughout the book on how current mathematical software can be used to discover and prove interesting properties of these functions. The book provides a transition between elementary mathematics and more advanced topics, trying to make this transition as smooth as possible. Many topics occur in the book, but they are all part of a bigger picture of mathematics. By delving into a variety of them, the reader will develop this broad view. The large collection of problems is an essential part of the book. The problems vary from routine verifications of facts used in the text to the exploration of open questions.

Contents: *Preface* ◆ Chapter 1. The Number Systems ◆ The natural numbers ◆ An automatic approach to finite sums ◆ Elementary counting ◆ The integers and divisibility ◆ The Euclidean algorithm ◆ Modular arithmetic ◆ Prime numbers ◆ The rational numbers ◆ The set of real numbers ◆ Fundamental sequences and completions ◆ Complex numbers ◆ Chapter 2. Factorials and Binomial Coefficients ◆ The definitions ◆ A counting argument ◆ The generating function of binomial coefficients ◆ An extension of the binomial theorem to noninteger exponents ◆ Congruences for factorials and binomial coefficients ◆ The prime factorization of n! ◆ The central binomial coefficients ◆ Bertrand's postulate ◆ Some generating functions involving valuations ◆ The asymptotics of factorials: Stirling's formula ◆ The trinomial coefficients ◆ Chapter 3. The Fibonacci Numbers ◆ Introduction ◆ What do they count? ◆ The generating function ◆ A family of related numbers ◆ Some arithmetical properties ◆ Modular properties of Fibonacci numbers ◆ Continued fractions of powers of Fibonacci quotients ◆ Fibonacci polynomials ◆ Series involving Fibonacci numbers ◆ Chapter 4. Polynomials ◆ Introduction ◆ Examples of polynomials ◆ The division algorithm ◆ Roots of polynomials ◆ The fundamental theorem of algebra ◆ The solution of polynomial equations ◆ Cubic polynomials ◆ Quartic polynomials ◆ Chapter 5. Binomial Sums ◆ Introduction ◆ Power sums ◆ Moment sums ◆ Recurrences for powers of binomials ◆ Calkin's identity ◆ Chapter 6. Catalan Numbers ◆ The placing of parentheses ◆ A recurrence ◆ The generating function ◆ Arithmetical properties ◆ An integral expression ◆ Chapter 7. The Stirling Numbers of the Second Kind ◆ Introduction ◆ A recurrence ◆ An explicit formula ◆ The valuations of Stirling numbers ◆ Chapter 8. Rational Functions ◆ Introduction ◆ The method of partial fractions ◆ Rational generating functions ◆ The operator point of view ◆ A dynamical system ◆ Sums of four squares ◆ The integration of rational functions ◆ Symbolic integration. The methods of Hermite and Rothstein-Trager ◆ Chapter 9. Wallis' Formula ◆ An experimental approach ◆ A proof based on recurrences ◆ A proof based on generating functions ◆ A trigonometric version ◆ An automatic proof ◆ Chapter 10. Farey Fractions ◆ Introduction ◆ Farey fractions and the Stern-Brocot tree ◆ The distribution of denominators ◆ Chapter 11. The Exponential

Function ◆ Introduction ◆ Elementary properties of the exponential function ◆ The constant e ◆ The series representation of e ◆ Arithmetical properties of e ◆ Continued fractions connected to e ◆ Derangements: The presence of e in combinatorics ◆ The natural logarithm ◆ The binary expansion of ln 2 ◆ The irrationality of ln 2 ◆ Harmonic numbers ◆ Chapter 12. Trigonometric Functions ◆ Introduction ◆ The notion of angle ◆ Sine and cosine ◆ The additional trigonometric functions ◆ The addition theorem ◆ Stirling's formula and π ◆ The continued fraction of π ◆ The digits of π in base 16 ◆ Special values of trigonometric functions ◆ The roots of a cubic polynomial ◆ A special trigonometric integral ◆ The infinite product for sin x ◆ The irrationality of π ◆ Arctangent sums and a dynamical system ◆ Chapter 13. Bernoulli Polynomials ◆ Introduction ◆ The exponential generating function ◆ Elementary properties of Bernoulli numbers ◆ Integrals involving Bernoulli polynomials ◆ A relation to Stirling numbers ◆ Arithmetic properties of Bernoulli numbers ◆ The Euler-MacLaurin summation formula ◆ Bernoulli numbers and solitons ◆ The Giuga-Agoh conjectured criterion for primality ◆ Chapter 14. A Sample of Classical Polynomials: Legendre, Chebyshev, and Hermite ◆ Introduction ◆ Legendre polynomials ◆ Chebyshev polynomials ◆ Hermite polynomials ◆ Chapter 15. Landen Transformations ◆ Introduction ◆ An elementary example ◆ The case of rational integrands ◆ The evaluation of a quartic integral ◆ An integrand of degree six ◆ The original elliptic case ◆ Chapter 16. Three Special Functions: Γ, ψ, and ζ ◆ Introduction ◆ The gamma function ◆ Elementary properties of the gamma function ◆ Special values of the gamma function ◆ The infinite product for the gamma function ◆ The beta function ◆ The digamma function ◆ The Riemann zeta function ◆ The values of ζ(2n) ◆ Apéry's constant ζ(3) ◆ *Bibliography* ◆ *Index*

2016	504 pp	Paperback
978-1-4704-2596-8		₹ 1,740.00

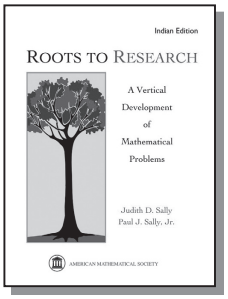
Number Theory and Geometry

Roots to Research: A Vertical Development of Mathematical Problems

AMS

Judith D Sally
Northwestern University, Evanston, USA

Paul J Sally, Jr.
University of Chicago, USA



Certain contemporary mathematical problems are of particular interest to teachers and students because their origin lies in mathematics covered in the elementary school curriculum and their development can be traced through high school, college, and university level mathematics. This book is intended to provide a source for the mathematics (from beginning to advanced) needed to understand the emergence and evolution of five of these problems: The Four Numbers Problem, Rational Right Triangles, Lattice Point Geometry, Rational Approximation, and Dissection.

Each chapter begins with the elementary geometry and number theory at the source of the problem, and proceeds (with the exception of the first problem) to a discussion of important results in current research. The introduction to each chapter summarizes the contents of its various sections, as well as the background required.

The book is intended for students and teachers of mathematics from high school through graduate school. It should also be of interest to working mathematicians who are curious about mathematical results in fields other than their own. *It can be used by teachers at all of the above mentioned levels for the enhancement of standard curriculum materials or extra-curricular projects.*

Contents: The Four Numbers Problem ◆ Rational Right Triangles and the Congruent Number Problem ◆ Lattice Point Geometry ◆ Rational Approximation ◆ Dissection ◆ *Bibliography* ◆ *Appendix A. Volume* ◆ *Appendix. Bibliography* ◆ *Appendix B. Convexity* ◆ *Appendix. Bibliography* ◆ *Index*

2012	352 pp	Paperback
978-0-8218-8725-7		₹ 1,600.00

Numerical Analysis

Applied Numerical Linear Algebra

James Demmel
University of California, CA

See page 102

Approximation Theory and Approximation Practice

Nick Trefethen
Oxford University, Oxford, UK

See page 41

Computer Programming and Numerical Analysis: An Integrated Approach
(Revised Edition with C)

N Datta
Head, Department of Mathematics, Heritage Institute of Technology, Kolkata; formerly Senior Professor, Department of Mathematics, Indian Institute of Technology Kharagpur, Kharapur, India

The availability of high-speed digital computers has led to the widespread study of computer programming and numerical analysis in Indian universities and technolo-gical institutes. *This book presents the theory and applications of numerical methods for the solution of various types of computational problems in Science and Engineering.*

Contents: *Preface* ◆ Introduction to Computer Systems ◆ Problem Solving on a Computer ◆ FORTRAN Language Fundamentals ◆ Expression and Assignment Statements ◆ Simple Input/output Statements ◆ Control Statements ◆ Subscripted Variables ◆ Subprograms ◆ Files and General Input/output Statements ◆ Programming ◆ Errors in Numerical Computation ◆ Interpolation ◆ Numerical Differentiation and Integration ◆ Solution of Algebraic and Transcendental Equations ◆ Solution of Systems of Linear Equations ◆ Numerical Solution of Ordinary Differential Equations ◆ Matrix Eigen value Problem ◆ Finite Difference Methods for Solving BVP Associated with Partial Differential Equations ◆ Miscellaneous topics ◆ Programs ◆ *Appendix A: The Programming Language C* ◆ *Appendix B: Some Selected Programs* ◆ *Index*

2003 **516 pp** **Paperback**
978–81–7371–451–1 **₹ 795.00**

Introduction to Stochastic Differential Equations, An

Lawrence C Evans
University of California, Berkeley, Berkeley, CA

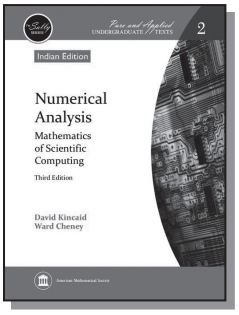
See page 61

Numerical Analysis: Mathematics of Scientific Computing
(Third Edition)

AMS

David Kincaid
University of Texas at Austin, USA

Ward Cheney
University of Texas at Austin, USA



This book introduces students with diverse backgrounds to various types of mathematical analysis that are commonly needed in scientific computing. The subject of numerical analysis is treated from a mathematical point of view, offering a complete analysis of methods for scientific computing with appropriate motivations and careful proofs.

In an engaging and informal style, the authors demonstrate that many computational procedures and intriguing questions of computer science arise from theorems and proofs. *Algorithms are presented in pseudo code, so that students can immediately write computer programs in standard languages or use interactive mathematical software packages.*

Contents: Mathematical ◆ Preliminaries ◆ Computer Arithnetic ◆ Solution of Nonlinear Equations ◆ Solving Systems of Linear Equations ◆ Selected Topics in Numerical Linear Algebra ◆ Approximating

Functions ◆ Numerical Differentiation and Integration ◆ Numerical Solution of Ordinary Differential Equations ◆ Numerical Solution of Partial Differential Equations ◆ Linear Programming and Related Topics ◆ Optimization ◆ *Appendix A: An Overview of Mathematical Software* ◆ *Bibliography* ◆ *Index*

2010	788 pp	Paperback
978-0-8218-5207-1		₹ 2,770.00

Numerical Methods with Programs in BASIC, FORTRAN, Pascal and C++ (Revised Edition)

S Balachandra Rao
Formerly Head, Department of Mathematics, National College, Bengaluru, India

C K Shantha
Head, Department of Mathematics, Mount Carmel College, Bengaluru, India

The book discusses the important numerical methods which are frequently used in mathematical, physical, engineering and even biological sciences. It will serve as an *ideal textbook for the undergraduate and diploma courses.*

The revised edition has a section on C++ and programs in C++.

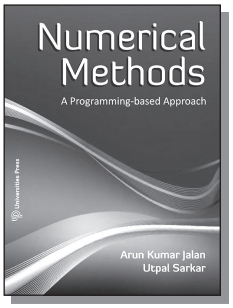
Contents: *List of Programs* ◆ *Preface* ◆ *Acknowledgements* ◆ Numbers, Errors and Accuracy ◆ Iterative Process ◆ Solution of Nonlinear Equations ◆ Finite Differences and Interpolation ◆ Numerical Differentiation ◆ Numerical Integration ◆ System of Linear Equations ◆ Eigenvalues and eigenvectors ◆ Differential Equations ◆ A Primer to Computer Programming ◆ Appendix: C++ Programs ◆ *Answers to Problems* ◆ *Bibliography* ◆ *Index*

2004	504 pp	Paperback
978-81-7371-472-6		₹ 995.00

Numerical Methods: A Programming-based Approach

Arun Kumar Jalan
Professor in Mathematics, Dean of Students' Affairs, M C K V Institute of Engineering, Howrah, India

Utpal Sarkar
Assistant Professor in Mathematics, M C K V Institute of Engineering, Howrah, India



Online resources available

This textbook presents the frequently used numerical methods in a simple, well-structured and logical manner to enable students to easily grasp the pertinent concepts. All the concepts are accompanied by numerous solved problems of varying levels of difficulty to further strengthen and consolidate the students' understanding. From a software perspective, algorithms as well as C programs are included to enable the student to optimise their usage of the techniques. The text is well supported with problems, illustrations, assignments, MCQs and long and short answer questions, thereby providing an exam-oriented approach.

Online resource available at:
www.universitiespress.com/arunsarkar/nm

Contents: *Preface and Acknowledgements* ◆ 1 Approximation in Numerical Computations ◆ Introduction d Exact Number, Approximate Number and Significant Digits/Figures d Rounding Numbers ◆ Errors, Truncation and Rounding Errors ◆ Fixed Point and Floating Point Arithmetic ◆ Propagation of Errors ◆ General Error Formula ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Calculus of Finite Differences** ◆ Introduction ◆ Finite Differences ◆ Forward Differences ◆ Backward Differences ◆ Shift Operator ◆ Central Difference Operator and Averaging Operator ◆ Divided Differences ◆ Factorial Notation ◆ Propagation of Error in the Difference Table ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Interpolation** ◆ Introduction ◆ Interpolation and Extrapolation ◆ Interpolation with Equal Intervals ◆ Interpolation with Unequal Intervals ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Numerical**

Integration ◆ Introduction ◆ General Quadrature Formula for Equidistant Ordinates ◆ Trapezoidal Rule ◆ Simpson's 1/3 Rule ◆ Simpson's 3/8 Rule ◆ Boole's Rule ◆ Weddle's Rule ◆ Newton–Cote's Quadrature Formula ◆ Solved Examples ◆ Romberg's Method ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Numerical Solutions of Ordinary Differential Equations** ◆ Introduction ◆ Taylor Series Method ◆ Picard's Method ◆ Euler's Method ◆ Euler's Modified Formula ◆ Runge–Kutta Method ◆ Predictor–Corrector Method ◆ Finite Difference Method ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Numerical Solutions of Algebraic and Transcendental Equations** ◆ Introduction ◆ Mathematical Preliminaries ◆ Order of Convergence ◆ Method of Iteration ◆ Bisection Method ◆ Regula Falsi Method (Method of False Position) ◆ The Secant Method ◆ Newton–Raphson Method ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer* ◆ *Questions* ◆ **Numerical Solution of a System of Linear Equations** ◆ Introduction ◆ Direct Methods ◆ Iterative Methods ◆ *Solved Examples* ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Curve Fitting and Spline Interpolation** ◆ Curve Fitting ◆ Spline Interpolation ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Algorithms and Programs in C Language** ◆ Introduction ◆ Overview of C Language ◆ Newton's Forward Interpolation ◆ Newton's Backward Interpolation ◆ Lagrange's Interpolation ◆ Trapezoidal Rule ◆ Simpson's 1/3 Rule ◆ Weddle's Rule ◆ Bisection Method ◆ Regula Falsi Method ◆ The Secant Method ◆ Newton–Raphson Method ◆ Euler's Method ◆ Runge–Kutta Method of Order Four ◆ Gauss Elimination Method ◆ Gauss–Seidel Method ◆ Fitting the Straight Line $y = a + bx$ ◆ Fitting the Curve $y = ax + bx^2$ ◆ *Multiple Choice Questions* ◆ *Short Answer Questions* ◆ *Long Answer Questions* ◆ **Introduction to Software Packages** ◆ Introduction to MATLAB ◆ Introduction to SCILAB ◆ Introduction to LabVIEW ◆ Introduction to Mathematica ◆ *Appendix: Fourier Series and Fourier Transforms* ◆ *Index*

2015	432 pp	Paperback
978–81–7371–958–5		₹ 775.00

Operations Research

Convex Optimization Theory

Dimitri P Bertsekas
McAfee Professor of Engineering,
Massachusetts Institute of Technology, Cambridge, USA

The book *Convex Optimization Theory* provides an insightful, concise and rigorous treatment of the basic theory of convex sets and functions in finite dimensions and the analytical/geometrical foundations of convex optimization and duality theory. The convexity theory is developed first in a simple accessible manner using easily visualized proofs. The focus then shifts to a transparent geometrical line of analysis to develop the fundamental duality between descriptions of convex sets and functions in terms of points and in terms of hyperplanes. Finally, convexity theory and abstract duality are applied to problems of constrained optimization, Fenchel and conic duality and game theory to develop the sharpest possible duality results within a highly visual geometric framework.

The Indian edition of the book alone carries a supplementary chapter containing the most popular convex optimization algorithms and some of the new optimization algorithms otherwise available at http://www.athenasc.com/convexduality.html.

Key Features: Rigorous and comprehensive development of the theory of convex sets and functions in the classical tradition of Fenchel and Rockafellar ◆ A geometric and highly visual treatment of convex optimization problems including duality, existence of solutions, and optimality conditions ◆ An insightful and comprehensive presentation of minimax theory and zero sum games and its connection with duality ◆ Contains many examples and illustrations in the text ◆ Inclusion of many examples, illustrations, exercises with complete solutions and a supplementary chapter on the most popular convex optimization algorithms ◆ Useable as a standalone text for a theoretically-oriented class on convex analysis and optimization, or as a theoretical supplement to either an applications/convex optimization models class or a nonlinear programming class

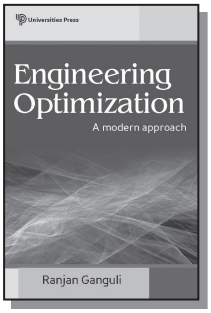
Contents: Basic Concepts of Convex Analysis ◆ Basic Concepts of Polyhedral Convexity ◆ Basic

Concepts of Convex Optimization ◆ Geometric Duality Framework ◆ Duality and Optimization ◆ *Appendix A: Mathematical Background & Notes and Sources* ◆ *Supplementary Chapter 6 on Convex Optimization Algorithms*

2010	**420 pp**	**Paperback**
978–81–7371–714–7		**₹ 1,350.00**

Engineering Optimization: A Modern Approach

Ranjan Ganguli
Professor, Department of Aerospace Engineering, Indian Institute of Science, Bengaluru, India



Online resources available

This book aims to make the optimization technique pervasive in engineering design by moving the problem from an academic setting to an industrial platform. It provides a thorough understanding of the concepts of optimization necessary for a robust design of technical systems. The approach is from a modern perspective; it dwells on surrogate modelling and non-gradient-based algorithms and at the same time emphasizes classical methods for pedagogical reasons. Nonlinear optimization, response-surface method and genetic-algorithm approaches have been focussed upon to bridge the gap between nonlinear programming and engineering optimization techniques.

The best way to learn optimization methods is undoubtedly by solving problems and following it up with exercises in computer programming. To enable this experience, the book *has several solved examples*, some of them non-trivial, *besides many unsolved problems* for the student to work out.

Online resources available at:
www.universitiespress.com/ranjnganguli/eoma

Contents: *Preface* ◆ Basic concepts ◆ Direct one-dimensional search ◆ Gradient-based methods ◆ Newtonian methods ◆ Constrained optimization methods Response surface method ◆ Genetic algorithm ◆ *Bibliography* ◆ *Index*

Distributed worldwide by CRC Press LLC, USA, Taylor and Francis Group, except in India, Pakistan, Bangladesh, Sri Lanka, Nepal and Bhutan.

2012	**268 pp**	**Paperback**
978–81–7371–739–0		**₹ 870.00**

Linear Optimization and Extensions: Problems and Solutions

Dimitris Alevras & Manfred W Padberg

Series: Low Priced Edition of Springer Mathematics Titles

This book offers a *comprehensive treatment of the exercises and case studies* as well as summaries of the chapters of the book Linear Optimization and Extensions by Manfred Padberg. It covers the areas of linear programming and the optimisation of linear functions over polyhedra infinite dimensional Euclidean vector spaces.

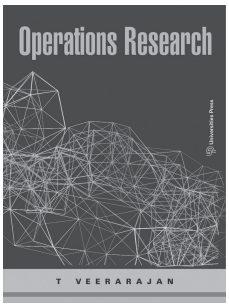
The main topics treated in the book are: Simplex algorithms and their derivatives including the duality theory of linear programming; Polyhedral theory, pointwise and linear descriptions of polyhedra, double description algorithms, Gaussian elimination with and without division, the complexity of simplex steps; Projective algorithms, the geometry of projective algorithms, Newtonian barrier methods; Ellipsoids algorithms in perfect and infinite precision arithmetic, the equivalence of linear optimisation and polyhedral separation; The foundations of mixed-integer programming and combinatorial optimisation.

Contents: *Introduction* ◆ The Linear Programming Problem ◆ Basic Concepts ◆ Five Preliminaries ◆ Simplex Algorithms ◆ Primal-Dual Pairs ◆ Analytical Geometry ◆ Projective Algorithms ◆ Ellipsoid Algorithms ◆ Combinatorial Optimization: An Introduction ◆ *Appendix A: Short-Term Financial Management* ◆ *Appendix B: Operations Management in a Refinery* ◆ *Appendix C: Automatized Production: PCBs and Iliysses' Problem* ◆ *Bibliography* ◆ *Index*

2010	**460 pp**	**Paperback**
978–81–8489–524–7		**₹ 1,200.00**

Operations Research

T Veerarajan
Dean (Retired), Department of Mathematics, Velammal College of Engineering and Technology, Madurai



Online resources available

Operations Research is a discipline that uses quantitative and mathematical techniques for decision-making when the selection involved is complex and cannot be arrived at using routine judgment and expertise. The book has been designed for graduate and post-graduate students of engineering, mathematics, statistics and management in Indian universities. The book provides a practical introduction to the primary concepts and techniques of optimization and the application of operations research to the major phases of problem solving.

Online resources available at:
www.universitiespress.com/tveerarajan/operationsresearch

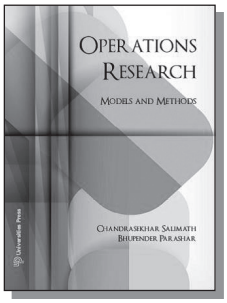
Contents: Linear Programming ◆ Two-phase Simplex Method ◆ Revised Simplex Method ◆ Dual and Dual Simplex Programming ◆ Dynamic Programming ◆ Integer Programming ◆ Non-linear Programming ◆ Transportation and Assignment Problems ◆ Sequencing ◆ Game Theory ◆ Inventory Control ◆ Replacement and Maintenance Problems ◆ Network Scheduling of Projects by PERT/CPM Techniques ◆ Markov Chains ◆ Queueing Models ◆ Simulation ◆ *Bibliography* ◆ *Index*

2017	532 pp	Paperback
978-93-86235-16-9		₹ 855.00

Operations Research, Models and Methods

Chandrasekhar Salimath
Formerly Professor, J S S Academy of Technical Education, Noida, India

Bhupender Parashar
Associate Professor, J S S Academy of Technical Education, Noida, India



The guiding philosophy of the authors has been to treat the subject matter from a mathematical perspective, highlighting the fact that Operations Research is essentially a science of decision making, affecting almost every aspect of life and translating into real life benefits. Their approach has been two-fold—to motivate the students to learn the basic concepts of OR while developing mathematical modelling and problem solving skills, and to enhance their decision making capabilities. This book on Operations Research covers the existing syllabi of UG/PG programmes in many of the Indian Technical Universities.

Contents: *Preface* ◆ *Roadmap (How to use the book)* ◆ Operations Research—An Overview ◆ Linear Programming (LP)-I ◆ Linear Programming (LP)-II ◆ Transportation Problem (TP) ◆ Assignment Problem (AP) ◆ Job Sequencing Problem (JSP) ◆ Network Models ◆ Project Management ◆ Game Theory ◆ Queueing (Waiting Line) Theory ◆ Inventory Control (Management) ◆ Replacement (Maintenance) Theory Suggested Reading ◆ *Index*

2014	436 pp	Paperback
978-81-7371-931-8		₹ 725.00

Operator Theory

Problems in Operator Theory

AMS

Y A Abramovich
Indiana University–Purdue University, Indianapolis, USA

C D Aliprantis
Purdue University, West Lafayette, USA

This is one of the few books available in the literature that contains problems devoted entirely to the theory of operators on Banach spaces and Banach lattices. The book contains complete solutions to the more than 600 exercises in the companion volume, An Invitation to Operator Theory, Volume 50 in the AMS series Graduate Studies in Mathematics, also by Abramovich and Aliprantis.

The exercises and solutions contained in this volume serve many purposes. First, they provide an opportunity to the readers to test their understanding of the theory. Second, they are used to demonstrate explicitly technical details in the proofs of many results in operator theory, providing the reader with rigorous and complete accounts of such details. Third, the exercises include many well-known results whose proofs are not readily available elsewhere. Finally, the book contains a considerable amount of additional material and further developments. By adding extra material to many exercises, the authors have managed to keep the presentation as self-contained as possible.

The book can be very useful as a supplementary text to graduate courses in operator theory, real analysis, function theory, integration theory, measure theory, and functional analysis. It will also make a nice reference tool for researchers in physics, engineering, economics, and finance.

Contents: Odds and ends ◆ Basic operator theory ◆ Operators on AL- and AM-spaces ◆ Special classes of operators ◆ Integral operators ◆ Spectral properties ◆ Some special spectra ◆ Positive matrices ◆ Irreducible operators ◆ Invariant subspaces ◆ The Daugavet equation ◆ *Bibliography* ◆ *Index*

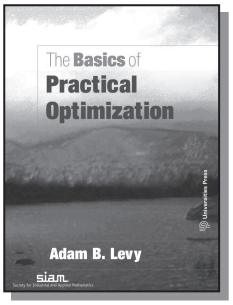
2012	**400 pp**	**Paperback**
978–0–8218–8716–5		**₹ 1,670.00**

Optimisation

Basics of Practical Optimization, The

AMS

Adam Levy
Bowdoin College, Brunswick, ME



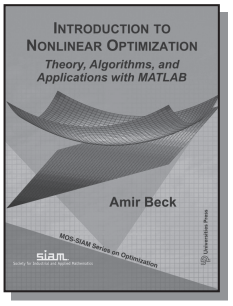
This textbook provides undergraduate students with an introduction to optimization and its uses for relevant and realistic problems. The only prerequisite for readers is a basic understanding of multivariable calculus because additional materials, such as explanations of matrix tools, are provided in a series of Asides both throughout the text at relevant points and in a handy appendix.

2017	**168 pp**	**Paperback**
978–93–86235–43–5		**₹ 660.00**

Introduction to Nonlinear Optimization: Theory, Algorithms, and Applications with MATLAB

AMS

Amir Beck
The Technion–Israel Institute of Technology, Israel



This book provides the foundations of the theory of nonlinear optimization as well as some related algorithms and presents a variety of applications from diverse areas of applied sciences. The

author combines three pillars of optimization – theoretical and algorithmic foundation, familiarity with various applications, and the ability to apply the theory and algorithms on actual problems – and rigorously and gradually builds the connection between theory, algorithms, applications and implementation.

2017	296 pp	Paperback
978-93-86235-35-0		₹ 1,150.00

Iterative Methods for Linear Systems: Theory and Applications

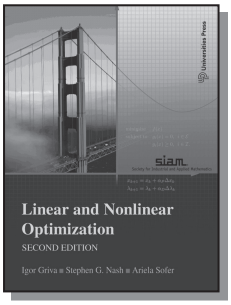
Maxim A Olshanskii
University of Houston, Houston, TX

See page 55

Linear and Nonlinear Optimization, Second Edition

AMS

Igor Griva, Ariela Sofer
Georgia Mason University, Fairfax, VA



Provides an introduction to the applications, theory and algorithms of linear and nonlinear optimization. The emphasis is on practical aspects—discussing modern algorithms, as well as the influence of theory on the interpretation of solutions or on the design of software. The book includes several examples of realistic optimization models that address important applications. The succinct style of this second edition is punctuated with numerous real-life examples and exercises, and the authors include accessible explanations of topics that are not often mentioned in textbooks, such as duality in nonlinear optimization, primal-dual methods for nonlinear optimization, filter methods, and applications such as support-vector machines. The book is designed to be flexible. It has a modular structure, and uses consistent notation and terminology throughout. It can be used in many different ways, in many different courses, and at many different levels of sophistication.

2017	768 pp	Paperback
978-93-86235-37-4		₹ 1,495.00

When Least is Best: How Mathematicians Discovered Many Clever Ways to Make Things as Small (or as Large) as Possible

Paul J Nahin

What is the best way to photograph a speeding bullet? Why does light move through glass in the least amount of time possible? How can lost hikers find their way out of a forest? What will rainbows look like in the future? Why do soap bubbles have a shape that gives them the least area?

By combining the mathematical history of extrema with contemporary examples, Paul J. Nahin answers these intriguing questions and more in this engaging and witty volume. Nahin tells the story of Dido's problem, Fermat and Descartes, Torricelli, Bishop Berkeley, Goldschmidt, and more.

This is the first book on optimisation written for a wide audience, and math enthusiasts of all backgrounds will delight in its lively topics.

2004	392 pp	Paperback
978-81-7371-510-5		₹ 1,170.00

Probability

Analysis of Stochastic Partial Differential Equations

Davar Khoshnevisan
University of Utah, Salt Lake City, UT

See page 56

Imaginary Tale, An: The Story of √–1

Paul J Nahin

The author tells the 2000-year-old history of one of mathematics' most elusive numbers, the square root of minus one, *also known as i*, re-creating the baffling mathematical problems that conjured it up and the colourful characters who tried to solve them. *Addressing readers with both a general and scholarly interest in mathematics, Nahin weaves into this narrative entertaining historical facts, mathematical discussions, and the application of complex numbers and functions to important problems.*

2001	**280 pp**	**Paperback**
978–81–7371–399–6		**₹ 1,050.00**

Introduction to Probability (Second Edition)

AMS

Charles M Grinstead
Swarthmore College, USA

J Laurie Snell
Dartmouth College, Hanover, USA

This text is designed for an introductory probability course at the university level for sophomores, juniors, and seniors in mathematics, physical and social sciences, engineering, and computer science. It presents a thorough treatment of ideas and techniques necessary for a firm understanding of the subject.

The text is also recommended for use in discrete probability courses. The material is organised so that the discrete and continuous probability discussions are presented in a separate, but parallel, manner. This organisation does not emphasise an overly rigorous or formal view of probability and therefore offers some strong pedagogical value. Hence, the discrete discussions can sometimes serve to motivate the more abstract continuous probability discussions.

Special features: Key ideas are developed in a somewhat leisurely style, providing a variety of interesting applications to probability and showing some non-intuitive ideas ◆ Over 600 exercises provide the opportunity for practising skills and developing a sound understanding of ideas ◆ Numerous historical comments deal with the development of discrete probability.

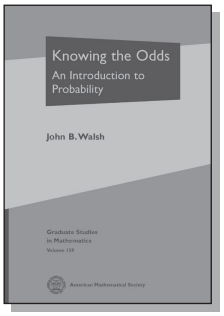
Contents: Reprint of entire volume ◆ Discrete probability distributions (Chapter 1) ◆ Continuous probability densities (Chapter 2) ◆ Combinatorics (Chapter 3) ◆ Conditional probability (Chapter 4) ◆ Important distributions and densities (Chapter 5) ◆ Expected value and variance (Chapter 6) ◆ Sums of independent random variables (Chapter 7) ◆ Law of large numbers (Chapter 8) ◆ Central limit theorem (Chapter 9) ◆ Generating functions (Chapter 10) ◆ Markov chains (Chapter 11) ◆ Random walks (Chapter 12) ◆ *Appendices* ◆ *Index*

2009	**528 pp**	**Paperback**
978–0–8218–4857–9		**₹ 2,065.00**

Knowing the Odds: An Introduction to Probability

AMS

John B Walsh
University of British Columbia, Vancouver, BC, Canada



This book covers in a leisurely manner all the standard material that one would want in a full year probability course with a slant towards applications in financial analysis at the graduate or senior undergraduate honors level. It contains a fair amount of measure theory and real analysis built in but it introduces sigma-fields, measure theory, and expectation in an especially elementary and intuitive way. A large variety of examples and exercises in each chapter enrich the presentation in the text.

Contents: *Preface* ◆ *Introduction* ◆ Chapter 1. Probability Spaces ◆ Sets and Sigma-Fields ◆ Elementary Properties of Probability Spaces ◆ The Intuition ◆ Conditional Probability ◆ Independence ◆ Counting: Permutations and Combinations ◆ The Gambler's Ruin ◆ Chapter 2. Random Variables ◆ Random Variables and Distributions ◆ Existence

of Random Variables ◆ Independence of Random Variables ◆ Types of Distributions ◆ Expectations I: Discrete Random Variables ◆ Moments, Means and Variances ◆ Mean, Median, and Mode ◆ Special Discrete Distributions ◆ Chapter 3. Expectations II: The General Case ◆ From Discrete to Continuous ◆ The Expectation as an Integral ◆ Some Moment Inequalities ◆ Convex Functions and Jensen's Inequality ◆ Special Continuous Distributions ◆ Joint Distributions and Joint Densities ◆ Conditional Distributions, Densities, and Expectations ◆ Chapter 4. Convergence ◆ Convergence of Random Variables ◆ Convergence Theorems for Expectations ◆ Applications ◆ Chapter 5. Laws of Large Numbers ◆ The Weak and Strong Laws ◆ Normal Numbers ◆ Sequences of Random Variables: Existence ◆ Sigma Fields as Information ◆ Another Look at Independence ◆ Zero-one Laws ◆ Chapter 6. Convergence in Distribution and the CLT ◆ Characteristic Functions ◆ Convergence in Distribution ◆ Levy's Continuity Theorem ◆ The Central Limit Theorem 6.5. Stable Laws ◆ Chapter 7. Markov Chains and Random Walks ◆ Stochastic Processes ◆ Markov Chains ◆ Classification of States ◆ Stopping Times ◆ The Strong Markov Property ◆ Recurrence and Transience ◆ Equilibrium and the Ergodic Theorem for Markov Chains ◆ Finite State Markov Chains ◆ Branching Processes ◆ The Poisson Process ◆ Birth and Death Processes ◆ Chapter 8. Conditional Expectations ◆ Conditional Expectations ◆ Elementary Properties ◆ Approximations and Projections ◆ Chapter 9. Discrete-Parameter Martingales ◆ Martingales ◆ System Theorems ◆ Convergence ◆ Uniform Integrability ◆ Applications ◆ Financial Mathematics I: The Martingale Connection ◆ Chapter 10. Brownian Motion ◆ Standard Brownian Motion ◆ Stopping Times and the Strong Markov Property ◆ The Zero Set of Brownian Motion ◆ The Reflection Principle ◆ Recurrence and Hitting Properties ◆ Path Irregularity ◆ The Brownian Infinitesimal Generator ◆ Related Processes ◆ Higher Dimensional Brownian Motion ◆ Financial Mathematics II: The Black-Scholes Model ◆ Skorokhod Embedding ◆ Levy's Construction of Brownian Motion ◆ The Ornstein-Uhlenbeck Process ◆ White Noise and the Wiener Integral ◆ Physical Brownian Motion ◆ What Brownian Motion Really Does ◆ *Bibliography* ◆ *Index*

2016	**440 pp**	**Paperback**
978–1–4704–2585–2		**₹ 1,390.00**

Learning Mathematics Through Modelling and Simulation: An Investigative Approach

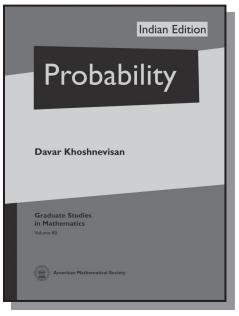
Jonaki Ghosh
Lady Shri Ram College for Women, Delhi, India
Amber Habib
Shiv Nadar Institution of Eminence, Delhi NCR, India
Geetha Venkataraman
Dr. B. R. Ambedkar University Delhi, India

See page 69

Probability

AMS

Davar Khoshnevisan
University of Utah, Salt Lake City, USA



This is a textbook for a one-semester graduate course in measure-theoretic probability theory, but with ample material to cover an ordinary year-long course at a more leisurely pace. *Khoshnevisan's* approach is to develop the ideas that are absolutely central to modern probability theory, and to showcase them by presenting their various applications. As a result, a few of the familiar topics are replaced by interesting non-standard ones. The topics range from undergraduate probability and classical limit theorems to Brownian motion and elements of stochastic calculus. *Throughout, the reader will find many exciting applications of probability theory and probabilistic reasoning. There are numerous exercises, ranging from the routine to the very difficult. Each chapter concludes with historical notes.*

Contents: *Preface* ◆ General Notation ◆ Classical ◆ Probability ◆ Bernoulli Trials ◆ Measure Theory ◆ Integration ◆ Product Spaces ◆ Independence ◆ The Central Limit Theorem ◆ Martingales ◆ Brownian

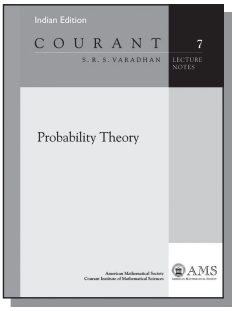
Motion ◆ Terminus: Stochastic Integration ◆ *Appendix* ◆ *Bibliography* ◆ *Index*

2012	240 pp	Paperback
978-0-8218-9181-0		₹ 1,525.00

Probability Theory

AMS

S R S Varadhan
New York University – Courant Institute of Mathematical Sciences, New York, USA



S R S Varadhan is recognized as a top expert in probability theory. This volume presents topics in probability theory covered during a first-year graduate course given by Varadhan at the Courant Institute of Mathematical Sciences. The necessary background material in measure theory is developed, including the standard topics, such as extension theorem, construction of measures, integration, product spaces, Radon-Nikodym theorem, and conditional expectation.

In the first part of the book, characteristic functions are introduced, followed by the study of weak convergence of probability distributions. Then both the weak and strong limit theorems for sums of independent random variables are proved, including the weak and strong laws of large numbers, central limit theorems, laws of the iterated logarithm, and the Kolmogorov three series theorem. The first part concludes with infinitely divisible distributions and limit theorems for sums of uniformly infinitesimal independent random variables.

The second part of the book mainly deals with dependent random variables, particularly martingales and Markov chains. Topics include standard results regarding discrete parameter martingales and Doob's inequalities. The standard topics in Markov chains are treated, i.e., transience, and null and positive recurrence. A varied collection of examples is given to demonstrate the connection between martingales and Markov chains.

Additional topics covered in the book include stationary Gaussian processes, ergodic theorems, dynamic programming, optimal stopping, and filtering. A large number of examples and exercises is included. The book is a suitable text for a first-year graduate course in probability.

S. R. S. Varadhan is the winner of the 2007 Abel Prize. Varadhan was awarded the prize "for his fundamental contributions to probability theory and in particular for creating a unified theory of large deviations".

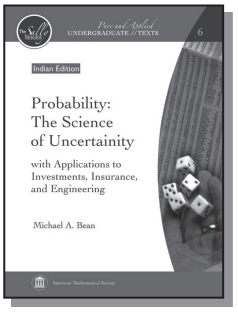
Contents: Measure theory ◆ Weak convergence ◆ Independent sums ◆ Dependent random variables ◆ Martingales ◆ Stationary stochastic processes ◆ Dynamic programming and filtering ◆ Bibliography ◆ *Index*

2014	176 pp	Paperback
978-1-4704-1914-1		₹ 1,320.00

Probability: The Science of Uncertainty: with Applications to Investments, Insurance and Engineering

AMS

Michael A Bean



This book covers the basic probability of distributions with an emphasis on applications from the areas of investments, insurance, and engineering. Written by a Fellow of the Casualty Actuarial Society and the Society of Actuaries with many years of experience as a university professor and industry practitioner, the book is suitable as a text for senior undergraduate and beginning graduate students in mathematics, statistics, actuarial science, finance, or engineering as well as a reference for practitioners in these fields.

The book is particularly well suited for students preparing for professional exams, and for several years it has been recommended as a textbook on the syllabus of examinations for the Casualty Actuarial Society and the Society of Actuaries.

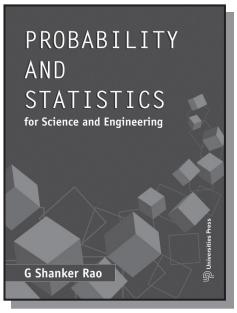
In addition to covering the standard topics and probability distributions, this book includes separate sections on more specialized topics such as mixtures and compound distributions, distributions of transformations, and the application of specialized distributions such as the Pareto, beta, and Weibull. The book also has a number of unique features such as a detailed description of the celebrated Markowitz investment portfolio selection model. A separate section contains information on how graphs of the specific distributions studied in the book can be created using Mathematica TM. The book includes a large number of problems of varying difficulty. A student manual with solutions to selected problems is available electronically from the 'Solutions Manual' link above. An instructor"s manual for this title is available electronically. Please send email to textbooks@ ams.org for more information.

Contents: Introduction ◆ A Survey of Some Basic ◆ Concepts Through Examples ◆ Classical Probability ◆ Random Variables and Probability Distributions ◆ Special Discrete Distributions ◆ Special Continuous ◆ Distributions ◆ Transformations of Random Variables ◆ Sums and Products of Random Variables Mixtures and Compound Distributions ◆ The Markowitz ◆ Investment Portfolio Selection Model ◆ *Appendixes* ◆ *Answers to Selected Exercises* ◆ *Index*

2012	**464 pp**	**Paperback**
978–0–8218–9177–3		**₹ 1,670.00**

Probability and Statistics for Science and Engineering

G Shankar Rao
Faculty Member, Department of Mathematics, University College of Engineering, Osmania University, Hyderabad, India



A firm understanding of the concepts of probability and statistics is essential for the quantitative analysis of risk, uncertainty and reliability in engineering problems. This introductory textbook, rich in solved problems, provides a *comprehensive coverage of the topics of probability and statistics for an undergraduate course in science and engineering.* The theoretical concepts are dealt with in a straightforward manner, with emphasis on their applications to real-world problems. Exercises of varied levels of difficulty have been included so as to give the student an exposure to wide variety of practical situations where the applications of the concepts learnt play a role in decision making.

Contents: *Preface* ◆ Probability ◆ Random Variables ◆ Probability Distributions ◆ Sampling Distributions ◆ Theory of Estimation ◆ Hypothesis Testing ◆ Distribution ◆ Test of Significance: Small Samples ◆ Curve Fitting ◆ Correlation and Regression ◆ Queueing Theory ◆ Stochastic Process ◆ *Appendix* ◆ *Bibliography* ◆ *Index*

2011	**524 pp**	**Paperback**
978–81–7371–744–4		**₹ 875.00**

Probability Theory and Stochastic Processes
(Fourth Edition)

Y Mallikarjuna Reddy
Principal and Professor, ECE Department, Vasireddy Venkatadri Institute of Technology, Nambur, Guntur, India

This book provides an introduction into the mathematical concepts and tools necessary for understanding the theory of probability and the dynamics of stochastic processes central to

a number of application areas in engineering sciences, biology medicine and finance. *The material covered in the book is particularly suited to an undergraduate programme in electronics and communications engineering*, for it focuses on probability and the random variable, on random processes, linear systems and probabilistic tools for modelling of noise, which are of direct relevance to this branch of engineering. Each topic is introduced with the fundamental concepts and underlying theories in a concise manner, and is then followed up with several worked-out examples for developing problem-solving skills in the learner. Many of the problems have been drawn from *previous years' examination papers* to give students an exposure to the variety and kinds typically encountered in exam situations; the focus of the selection is to train them in the use of explicit probability distributions for solving engineering and physics problems.

Contents: *Preface* ◆ Introduction to Probability ◆ The Random Variable ◆ Operations on One Random Variable ◆ Multiple Random Variables ◆ Operations on Multiple Random Variables ◆ *Random Processes* ◆ Random Processes: Spectral Characteristics ◆ Linear Systems with Random Processes ◆ *Solved JNTU Question Papers for the Year 1-2* ◆ *Appendix A: Indefinite Integrals, Definite Integrals and Finite Series* ◆ *Appendix B: Fourier Transform Pairs* ◆ *Bibliography* ◆ *Index*

2013	**672 pp**	**Paperback**
978–81–7371–887–8		**₹ 850.00**

Theory of Probability and Stochastic Processes

Pradip Kumar Ghosh
Professor, Department of ECE, Mody University of Science and Technology, Laxmangarh, India

The theory of probability, applied extensively in all fields of engineering and physical sciences to model situations and outcomes, finds usage in fields as varied as social and behavioural sciences, biology, economics, management and business studies as well. This book, *written to cater to an undergraduate engineering curriculum*, explains the concepts and the mathematics of probability and stochastic processes to enable a student to solve practical problems with confidence. It covers probability axioms, conditional probability, special distributions, random variables, expectations, generating functions, operations on random variables, random processes and their temporal and structural characteristics and response of linear systems to random signals. *Several solved examples illustrating the application of key concepts have been included in each chapter. This, together with the generous number of chapter-end exercises of varied levels of difficulty makes this book invaluable as a textbook on the subject.*

Contents: Theory of Probability ◆ Theory of Random Variables ◆ Functional Transformation of One Random Variable ◆ Statistical Characteristics of Two or More Random Variables ◆ Operations on Multivariate Random Variables ◆ Correlation Theory of Random Process ◆ Spectral Representation of Random Processes ◆ Response of Linear System to Random Signals ◆ *Bibliography* ◆ *Index*

2010	**284 pp**	**Paperback**
978–81–7371–673–7		**₹ 675.00**

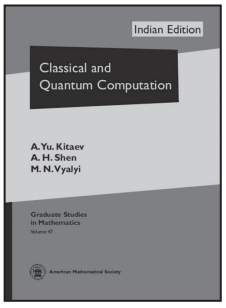
Quantum Computing

Classical and Quantum Computation

A Yu Kitaev
California Institute of Technology, Pasadena, USA

A H Shen
Independent University of Moscow, Russia

M N Vyalyi
Independent University of Moscow, Russia



This book is an introduction to a new rapidly developing theory of quantum computing. It begins with the basics of classical theory of computation: Turing machines, Boolean circuits, parallel algorithms, probabilistic computation,

NP-complete problems, and the idea of complexity of an algorithm. The second part of the book provides an exposition of quantum computation theory. It starts with the introduction of general quantum formalism (pure states, density matrices, and superoperators), universal gate sets and approximation theorems. Then the authors study various quantum computation algorithms: Grover's algorithm, Shor's factoring algorithm, and the Abelian hidden subgroup problem. In concluding sections, several related topics are discussed (parallel quantum computation, a quantum analog of NP-completeness, and quantum error-correcting codes).

Rapid development of quantum computing started in 1994 with a stunning suggestion by Peter Shor to use quantum computation for factoring large numbers--an extremely difficult and time-consuming problem when using a conventional computer. Shor's result spawned a burst of activity in designing new algorithms and in attempting to actually build quantum computers. Currently, the progress is much more significant in the former. A sound theoretical basis of quantum computing is under development and many algorithms have been suggested.

In this concise text, the authors provide solid foundations to the theory--in particular, a careful analysis of the quantum circuit model--and cover selected topics in depth. Included are a complete proof of the Solovay–Kitaev theorem with accurate algorithm complexity bounds, approximation of unitary operators by circuits of doubly logarithmic depth. Among other interesting topics are toric codes and their relation to the anyon approach to quantum computing.

Prerequisites are very modest and include linear algebra, elements of group theory and probability, and the notion of a formal or an intuitive algorithm. This text is suitable for a course in quantum computation for graduate students in mathematics, physics, or computer science. More than 100 problems (most of them with complete solutions) and an appendix summarizing the necessary results are a very useful addition to the book.

Contents: Introduction ◆ Classical computation ◆ Quantum computation ◆ Solutions ◆ Elementary number theory ◆ *Bibliography* ◆ *Index*

2013	**272 pp**	**Paperback**
978–1–4704–0927–2		**₹ 1,395.00**

Cross Disciplinary Advances in Quantum Computing

AMS

Kazem Mahdavi
University of Texas at Tyler, USA

Deborah Koslover
University of Texas at Tyler, USA

Leonard L Brown III
University of Texas at Tyler, USA

This volume contains a collection of papers, written by physicists, computer scientists, and mathematicians, from the Conference on Representation Theory, Quantum Field Theory, Category Theory, and Quantum Information Theory, which was held at the University of Texas at Tyler from October 1-4, 2009.

Quantum computing is a field at the interface of the physical sciences, computer sciences and mathematics. As such, advances in one field are often overlooked by practitioners in other fields. *This volume brings together articles from each of these areas to make students, researchers and others interested in quantum computation aware of the most current advances.* It is hoped that this work will stimulate future advances in the field.

Contents: *Preface* ◆ *List of Participants* ◆ Cartan Decomposition and Entangling Power of Braiding Quantum Gates ◆ A Unified Approach to Universality for Three Distinct Types of 2-qubit Quantum Computing Devices ◆ Efficient Algorithm for a Quantum Analogue of 2-SAT ◆ Quantum Computational Curvature and Jacobi Fields ◆ A Quantum Model for the Jones Polynomial, Khovanov Homology and Generalized Simplicial Homology ◆ Oriented Quantum Algebras and Coalgebras, Invariants of Oriented 1-1 Tangles, Knots and Links ◆ Space and Time Lattices in Frame Fields of Quantum Representations of Real and Complex Numbers

2013	**160 pp**	**Paperback**
978–1–4704–0920–3		**₹ 1,200.00**

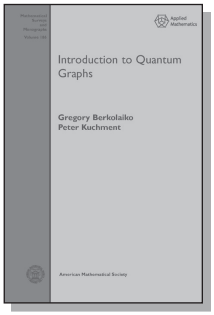
Quantum Graphs

Introduction to Quantum Graphs

AMS

Gregory Berkolaiko
Texas A&M University, College Station, USA

Peter Kuchment
Texas A&M University, College Station, USA



A "quantum graph" is a graph considered as a one-dimensional complex and equipped with a differential operator ("Hamiltonian"). Quantum graphs arise naturally as simplified models in mathematics, physics, chemistry, and engineering when one considers propagation of waves of various nature through a quasi-one-dimensional (e.g., "meso-" or "nano-scale") system that looks like a thin neighborhood of a graph. Since at least the 1930S, quantum graphs techniques have been applied successfully in various areas of mathematical physics, mathematics in general and its applications. This book provides a comprehensive introduction to the topic, collecting the main notions and techniques. It also contains a survey of the current state of the quantum graph research and applications.

Contents: *Preface* ◆ *Introduction* ◆ Chapter 1. Operators on Graphs. Quantum graphs ◆ Main graph notions and notation ◆ Difference operators. Discrete Laplace operators ◆ Metric graphs ◆ Differential operators on metric graphs. Quantum graphs ◆ Vertex conditions. Finite graphs ◆ Scale invariance ◆ Quadratic form ◆ Examples of vertex conditions ◆ Infinite graphs ◆ Non-local vertex conditions ◆ Further remarks and references ◆ Chapter 2. Quantum Graph Operators. Special Topics ◆ Quantum graphs and scattering matrices ◆ Scattering on vertices ◆ Bond scattering matrix and the secular equation ◆ First order operators and scattering matrices ◆ Factorization of quantum graph Hamiltonians ◆ Index of quantum graph operators ◆ Dependence on vertex conditions ◆ Variations in the edge lengths ◆ Magnetic Schrodinger operator ◆ Further remarks and references ◆ Chapter 3. Spectra of Quantum Graphs ◆ Basic spectral properties of compact quantum graphs ◆ Discreteness of the spectrum ◆ Dependence on the vertex conditions ◆ Eigenfunction dependence ◆ An Hadamard-type formula ◆ Generic simplicity of the spectrum ◆ Eigenvalue bracketing ◆ Dependence on the coupling constant at a vertex ◆ The Shnol' theorem 3.3. Generalized eigenfunctions ◆ Failure of the unique continuation property. Scars ◆ The ubiquitous Dirichlet-to-Neumann map ◆ DtN map for a single edge ◆ DtN map for a compact graph with a "boundary" ◆ DtN map for a single vertex boundary ◆ DtN map and the secular equation ◆ DtN map and number of negative eigenvalues ◆ Relations between quantum and discrete graph spectra ◆ Trace formulas ◆ Secular equation ◆ Weyl's law ◆ Derivation of the trace formula ◆ Expansion in terms of periodic orbits ◆ Other formulations of the trace formula ◆ Further remarks and references ◆ Chapter 4. Spectra of Periodic Graphs ◆ Periodic graphs ◆ Floquet-Bloch theory ◆ Floquet transform on combinatorial periodic graphs ◆ Floquet transform of periodic difference operators ◆ Floquet transform on quantum periodic graphs ◆ Floquet transform of periodic operators ◆ Band-gap structure of spectrum ◆ Discrete case ◆ Quantum graph case ◆ Floquet transform in Sobolev classes ◆ Absence of the singular continuous spectrum ◆ The point spectrum ◆ Where do the spectral edges occur? ◆ Existence and location of spectral gaps 4.8. Impurity spectra ◆ Further remarks and references ◆ Chapter 5. Spectra of Quantum Graphs. Special Topics ◆ Resonant gap opening ◆ "Spider" decorations ◆ Zeros of eigenfunctions and nodal domains ◆ Some basic results ◆ Bounds on the nodal count ◆ Nodal count for special types of graphs ◆ Nodal deficiency and Morse indices ◆ Spectral determinants of quantum graphs ◆ Scattering on quantum graphs ◆ Further remarks and references ◆ Chapter 6. Quantum Chaos on Graphs ◆ Classical "motion" on graphs ◆ Spectral statistics and random matrix theory ◆ Form factor of a unitary matrix ◆ Random matrices ◆ Spectral statistics of graphs ◆ Periodic orbit expansions ◆ On time-reversal invariance ◆ Diagonal approximation ◆ The simplest example of an off-diagonal term ◆ Further remarks and references ◆ Chapter 7. Some Applications and Generalizations ◆ Inverse problems

◆ Can one hear the shape of a quantum graph? ◆ Quantum graph isospectrality ◆ Can one count the shape of a graph? ◆ Inverse scattering ◆ Discrete "electrical impedance" problem ◆ Other types of equations on metric graphs ◆ Heat equation ◆ Wave equation ◆ Control theory ◆ Reaction-diffusion equations ◆ Dirac and Rashba operators ◆ Pseudo-differential Hamiltonians ◆ Non-linear Schrodinger equation (NLS) ◆ Analysis on fractals ◆ Equations on multistructures ◆ Graph models of thin structures ◆ Neumann tubes ◆ Dirichlet tubes ◆ "Leaky" structures ◆ Quantum graph modeling of various physical phenomena ◆ Simulation of quantum graphs by microwave networks ◆ Realizability questions ◆ Spectra of graphene and carbon nanotubes ◆ Vacuum energy and Casimir effect ◆ Anderson localization ◆ Bose-Einstein condensates ◆ Quantum Hall effect ◆ Flat band phenomena and slowing down light ◆ *Appendix A. Some Notions of Graph Theory ◆ A.1. Graph, edge, vertex, degree ◆ A.2. Some special graphs ◆ A.3. Graphs and digraphs ◆ A.4. Paths, closed paths, Betti number ◆ A.5. Periodic graph ◆ A.6. Cayley graphs and Schreier graphs ◆ Appendix B. Linear Operators and Operator-Functions ◆ B.1. Some notation concerning linear operators ◆ B.2. Fredholm and semi-Fredholm operators. Fredholm index ◆ B.3. Analytic Fredholm operator functions ◆ B.3.1. Some notions from the several complex variables theory ◆ B.3.2. Analytic Fredholm operator functions ◆ Appendix C. Structure of Spectra ◆ C.1. Classification of the points of the spectrum ◆ C.2. Spectral theorem and spectrum classification ◆ Appendix D. Symplectic Geometry and Extension Theory ◆ Bibliography ◆ Index*

2016	**288 pp**	**Paperback**
978–1–4704–2599–9		**₹1,395.00**

Quantum Mechanics

Mathematical Methods in Classical and Quantum Physics

Tulsi Dass & Satish K Sharma

The book is intended to provide an adequate background for various theoretical physics courses, especially those in classical mechanics, electrodynamics, quantum mechanics and statistical physics. Each topic is dealt with in a generally self-contained manner and *the text is interspersed with a number of solved examples and a large number of exercise problems.*

Contents: *Preface* ◆ *Acknowledgements* ◆ Vector analysis ◆ Matrices and Linear Vector Spaces ◆ Tensors ◆ Complex Variables ◆ Ordinary Differential Equations ◆ Special Functions ◆ Calculus of Variations ◆ Function Spaces, Orthogonal Expansions and Strum-Liouville Theory ◆ Integral Transforms: Generalized Functions ◆ Partial Differential Equations ◆ Green's Functions ◆ Probability and Statistics ◆ Elements of Group Theory ◆ *Appendix* ◆ *References* ◆ *Index*

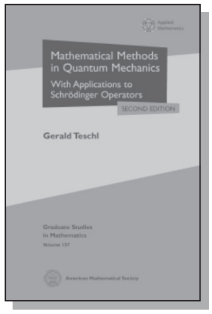
1998	**716 pp**	**Paperback**
978–81–7371–089–6		**₹1,050.00**

Mathematical Methods in Quantum Mechanics: With Applications to Schrodinger Operators

AMS

(Second Edition)

Gerald Teschl
University of Vienna, Austria



Quantum mechanics and the theory of operators on Hilbert space have been deeply linked since their beginnings in the early twentieth century. States of a quantum system correspond to certain elements of the configuration space and observables correspond to certain operators on the space. This book is a brief, but self-contained, introduction to the mathematical methods of quantum mechanics, with a view towards applications to Schrodinger operators. Part 1 of the book is a concise introduction to the spectral theory of unbounded operators. Only those topics that will be needed for later applications are covered. The spectral theorem is a central topic in this approach and is introduced at an early stage. Part 2 starts with the free Schrödinger equation and computes the free resolvent and

time evolution. Position, momentum, and angular momentum are discussed via algebraic methods. Various mathematical methods are developed, which are then used to compute the spectrum of the hydrogen atom. Further topics include the nondegeneracy of the ground state, spectra of atoms, and scattering theory. This book serves as a self-contained introduction to spectral theory of unbounded operators in Hilbert space with full proofs and minimal prerequisites: Only a solid knowledge of advanced calculus and a one-semester introduction to complex analysis are required. In particular, no functional analysis and no Lebesgue integration theory are assumed. It develops the mathematical tools necessary to prove some key results in nonrelativistic quantum mechanics. This new edition has additions and improvements throughout the book to make the presentation more student friendly. The book is written in a very clear and compact style. It is well suited for self-study and includes numerous exercises (many with hints).

Contents: *Preface* ◆ Part 0. Preliminaries ◆ Chapter 0. A first look at Banach and Hilbert spaces ◆ Warm up: Metric and topological spaces ◆ The Banach space of continuous functions ◆ The geometry of Hilbert spaces ◆ Completeness ◆ Bounded operators ◆ Lebesgue Lp spaces ◆ *Appendix: The uniform boundedness principle* ◆ Part 1. Mathematical Foundations of Quantum Mechanics ◆ Chapter 1. Hilbert spaces ◆ Hilbert spaces ◆ Orthonormal bases ◆ The projection theorem and the Riesz lemma ◆ Orthogonal sums and tensor products ◆ The C* algebra of bounded linear operators ◆ Weak and strong convergence ◆ *Appendix: The Stone–Weierstraß theorem* ◆ Chapter 2. Self-adjointness and spectrum ◆ Some quantum mechanics ◆ Self-adjoint operators ◆ Quadratic forms and the Friedrichs extension ◆ Resolvents and spectra ◆ Orthogonal sums of operators ◆ Self-adjoint extensions ◆ *Appendix: Absolutely continuous functions* ◆ Chapter 3. The spectral theorem ◆ The spectral theorem ◆ More on Borel measures ◆ Spectral types ◆ *Appendix: Herglotz–Nevanlinna functions* ◆ Chapter 4. Applications of the spectral theorem ◆ Integral formulas ◆ Commuting operators ◆ Polar decomposition ◆ The min-max theorem ◆ Estimating eigenspaces ◆ Tensor products of operators ◆ Chapter 5. Quantum dynamics ◆ The time evolution and Stone's theorem ◆ The RAGE theorem ◆ The Trotter product formula ◆ Chapter 6. Perturbation theory for self-adjoint operators ◆ Relatively bounded operators and the Kato–Rellich theorem ◆ More on compact operators ◆ Hilbert–Schmidt and trace class operators ◆ Relatively compact operators and Weyl's theorem ◆ Relatively form-bounded operators and the KLMN theorem ◆ Strong and norm resolvent convergence ◆ Part 2. Schr¨odinger Operators ◆ Chapter 7. The free Schrodinger operator ◆ The Fourier transform ◆ Sobolev spaces ◆ The free Schrodinger operator ◆ The time evolution in the free case ◆ The resolvent and Green's function ◆ Chapter 8. Algebraic methods ◆ Position and momentum ◆ Angular momentum ◆ The harmonic oscillator ◆ Abstract commutation ◆ Chapter 9. One-dimensional Schrodinger operators ◆ Sturm–Liouville operators ◆ Weyl's limit circle, limit point alternative ◆ Spectral transformations I ◆ Inverse spectral theory ◆ Absolutely continuous spectrum ◆ Spectral transformations II ◆ The spectra of one-dimensional Schrodinger operators ◆ Chapter 10. One-particle Schrodinger operators ◆ Self-adjointness and spectrum ◆ The hydrogen atom ◆ Angular momentum ◆ The eigenvalues of the hydrogen atom ◆ Nondegeneracy of the ground state ◆ Chapter 11. Atomic Schrodinger operators ◆ Self-adjointness ◆ The HVZ theorem ◆ Chapter 12. Scattering theory ◆ Abstract theory ◆ Incoming and outgoing states ◆ Schrodinger operators with short range potentials ◆ Part 3. Appendix ◆ *Appendix A. Almost everything about Lebesgue integration* ◆ *A.1. Borel measures in a nutshell* ◆ *A.2. Extending a premeasure to a measure* ◆ *A.3. Measurable functions* ◆ *A.4. How wild are measurable objects?* ◆ *A.5. Integration — Sum me up, Henri* ◆ *A.6. Product measures* ◆ *A.7. Transformation of measures and integrals* ◆ *A.8. Vague convergence of measures* ◆ *A.9. Decomposition of measures* ◆ *A.10. Derivatives of measures* ◆ *Bibliographical notes* ◆ *Bibliography* ◆ *Glossary of notation* ◆ *Index*

2016	320 pp	Paperback
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Set Theory

Basic Set Theory

AMS

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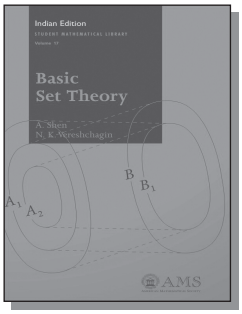


The main notions of set theory (cardinals, ordinals, transfinite induction) are fundamental to all mathematicians, not only to those who specialize in mathematical logic or set-theoretic topology. Basic set theory is generally given a brief overview in courses on analysis, algebra, or topology, even though it is sufficiently important, interesting, and simple to merit its own dedicated treatment.

This book provides just that in the form of a leisurely exposition for a diversified audience. It is suitable for a broad range of readers, from undergraduate students to professional mathematicians who want to finally find out what transfinite induction is and why it is always replaced by Zorn's Lemma.

The text introduces all main subjects of "naive" (nonaxiomatic) set theory: functions, cardinalities, ordered and well-ordered sets, transfinite induction and its applications, ordinals, and operations on ordinals. Included are discussions and proofs of the Cantor–Bernstein Theorem, Cantor's diagonal method, Zorn's Lemma, Zermelo's Theorem, and Hamel bases. With over 150 problems, the book is a complete and accessible introduction to the subject.

Contents: Sets and their cardinalities ◆ Ordered sets ◆ *Bibliography* ◆ *Glossary* ◆ *Index*

2014	**128 pp**	**Paperback**
978-1-4704-1918-9		**₹ 1,100.00**

Statistics

Actuarial Statistics: An Introduction Using R
(Second Edition)

Shailaja Deshmukh
Visiting Professor of Statistics, Department of Statistics, Savitribai Phule Pune University, India

Vidyagouri Prayag
Retired Principal Statistician, Cytel Software Development & Services, India

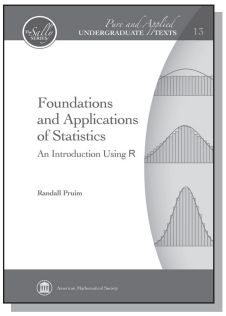
The book discusses theoretical derivations thoroughly, thereby offering a good insight into the determination of premiums and reserves for standard life insurance products. The novelty of the book is the use of R software to explain the concepts using numerical examples. These examples also facilitate the development of problem-solving skills in the insurance field. A large number of conceptual and computational exercises, as well as MCQs with answer keys, are included.

The R codes are deliberately kept simple, so that readers can understand the underlying theory with the minimal effort. The book is useful for students appearing for the IAI (Institute of Actuaries of India) examination. The book covers some parts from CS1, CS2, CM1, CM2 and SP2 (Life Insurance).

Foundations and Applications of Statistics: An Introduction Using R

AMS PRINT ON DEMAND

Randall Pruim
Calvin College, Grand Rapids, USA



This book simultaneously emphasizes both the foundational and the computational aspects of modern statistics. Engaging and accessible, this book is useful to undergraduate students with a wide range of backgrounds and career goals. The exposition immediately begins with statistics, presenting concepts and results from probability along the way. Hypothesis testing is introduced very early, and the motivation for several probability distributions comes from p-value computations. Pruim develops the students' practical statistical reasoning through explicit examples and through numerical and graphical summaries of data that allow intuitive inferences before introducing the formal machinery. The topics have been selected to reflect the current practice in statistics, where computation is an indispensible tool. In this vein the statistical computing environment r is used throughout the text and is integral to the exposition. Attention is paid to developing students' mathematical and computational skills as well as their statistical reasoning. Linear models, such as regression and ANOVA, are treated with explicit reference to the underlying linear algebra, which is motivated geometrically. Foundations and applications of statistics discusses both the mathematical theory underlying statistics and practical applications that make it a powerful tool across disciplines. The book contains ample material for a two-semester course in undergraduate probability and statistics. A one-semester course based on the book will cover hypothesis testing and confidence intervals for the most common situations.

Contents: *Preface* ◆ *What Is Statistics?* ◆ Chapter 1. Summarizing Data ◆ Data in R ◆ Graphical and Numerical Summaries of Univariate Data ◆ Graphical and Numerical Summaries of Multivariate Data ◆ Summary Exercises ◆ Chapter 2. Probability and Random Variables ◆ Introduction to Probability ◆ Additional Probability Rules and Counting Methods ◆ Discrete Distributions ◆ Hypothesis Tests and p-Values ◆ Mean and Variance of a Discrete Random Variable ◆ Joint Distributions ◆ Other Discrete Distributions ◆ Summary Exercises ◆ Chapter 3. Continuous Distributions ◆ pdfs and cdfs ◆ Mean and Variance ◆ Higher Moments ◆ Other Continuous Distributions ◆ Kernel Density Estimation ◆ Quantile-Quantile Plots ◆ Joint Distributions ◆ Summary Exercises ◆ Chapter 4. Parameter Estimation and Testing ◆ Statistical Models ◆ Fitting Models by the Method of Moments ◆ Estimators and Sampling Distributions ◆ Limit Theorems ◆ Inference for the Mean (Variance Known) ◆ Estimating Variance ◆ Inference for the Mean (Variance Unknown) ◆ Confidence Intervals for a Proportion ◆ Paired Tests ◆ Developing New Tests ◆ Summary Exercises ◆ Chapter 5. Likelihood-Based Statistics ◆ Maximum Likelihood Estimators ◆ Likelihood Ratio Tests ◆ Confidence Intervals ◆ Goodness of Fit Testing ◆ Inference for Two-Way Tables ◆ Rating and Ranking Based on Pairwise Comparisons ◆ Bayesian Inference ◆ Summary Exercises ◆ Chapter 6. Introduction to Linear Models ◆ The Linear Model Framework ◆ Simple Linear Regression ◆ Inference for Simple Linear Regression ◆ Regression Diagnostics ◆ Transformations in Linear Regression ◆ Categorical Predictors ◆ Categorical Response (Logistic Regression) ◆ Simulating Linear Models to Check Robustness ◆ Summary Exercises ◆ Chapter 7. More Linear Models ◆ Additive Models ◆ Assessing the Quality of a Model ◆ One-Way ANOVA ◆ Two-Way ANOVA ◆ Interaction and Higher Order Terms ◆ Model Selection ◆ More Examples ◆ Permutation Tests and Linear Models ◆ Summary Exercises ◆ *Appendix A. A Brief Introduction to R* ◆ *A.1. Getting Up and Running* ◆ *A.2. Working with Data* ◆ *A.3. Lattice Graphics in R* ◆ *A.4. Functions in R* ◆ *A.5. Some Extras in the fastR Package* ◆ *A.6. More R Topics Exercises* ◆ *Appendix B. Some Mathematical Preliminaries* ◆ *B.1. Sets* ◆ *B.2. Functions* ◆ *B.3. Sums and Products Exercises* ◆ *Appendix C. Geometry and Linear Algebra Review* ◆ *C.1. Vectors, Spans, and Bases* ◆ *C.2. Dot Products and Projections* ◆ *C.3. Orthonormal Bases* ◆ *C.4. Matrices 569 Exercises* ◆ *Appendix D. Review of Chapters 1–4* ◆ *D.1. R Infrastructure* ◆ *D.2. Data* ◆ *D.3. Probability Basics* ◆ *D.4. Probability Toolkit* ◆ *D.5. Inference* ◆ *D.6. Important Distributions Exercises Hints, Answers, and Solutions to Selected Exercises* ◆ *Bibliography* ◆ *Index to R Functions, Packages, and Data Sets Index*

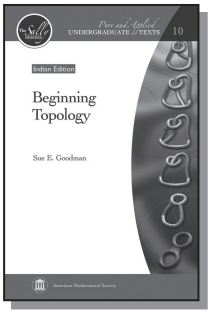
2016	640 pp	Paperback
978–1–4704–2577–7		₹1,950.00

Topology

Beginning Topology

AMS PRINT ON DEMAND

Sue E Goodman
University of North Carolina, Chapel Hill, USA



Beginning Topology is designed to give undergraduate students a broad notion of the scope of topology in areas of point-set, geometric, combinatorial, differential, and algebraic topology, including an introduction to knot theory. A primary goal is to expose students to some recent research and to get them actively involved in learning. *Exercises and open-ended projects are placed throughout the text, making it adaptable to seminar-style classes.*

The book starts with a chapter introducing the basic concepts of point-set topology, with examples chosen to captivate students' imaginations while illustrating the need for rigor. Most of the material in this and the next two chapters is essential for the remainder of the book. One can then choose from chapters on map coloring, vector fields on surfaces, the fundamental group, and knot theory.

A solid foundation in calculus is necessary, with some differential equations and basic group theory helpful in a couple of chapters. *Topics are chosen to appeal to a wide variety of students: primarily upper-level math majors, but also a few freshmen and sophomores as well as graduate students from physics, economics, and computer science.* All students will benefit from seeing the interaction of topology with other fields of mathematics and science; some will be motivated to continue with a more in-depth, rigorous study of topology.

Contents: Introduction to point set topology ◆ Surfaces ◆ The Euler characteristic ◆ Maps and graphs ◆ Vector fields on surfaces ◆ The fundamental group Introduction to knots ◆ *Bibliography and reading list* ◆ *Index*

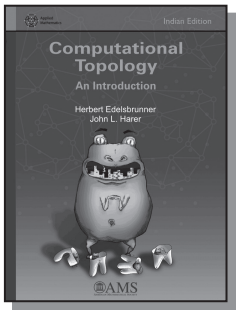
2012	**256 pp**	**Paperback**
978-0-8218-8705-9		**₹1,395.00**

Computational Topology: An Introduction

AMS

Herbert Edelsbrunner
Duke University, Durham; Geomagic, Research Triangle Park, USA

John L Harer
Duke University, Durham, USA



Combining concepts from topology and algorithms, this book delivers what its title promises: an introduction to the field of computational topology. Starting with motivating problems in both mathematics and computer science and building up from classic topics in geometric and algebraic topology, the third part of the text advances to persistent homology. This point of view is critically important in turning a mostly theoretical field of mathematics into one that is relevant to a multitude of disciplines in the sciences and engineering.

The main approach is the discovery of topology through algorithms. The book is ideal for teaching a graduate or advanced undergraduate course in computational topology, as it develops all the background of both the mathematical and algorithmic aspects of the subject from first principles.

Thus the text could serve equally well in a course taught in a mathematics department or computer science department.

Contents: *Preface* ◆ *A:* Computational Geometric Topology: Graphs ◆ Surfaces ◆ Complexes ◆ B: Computational Algebraic Topology: Homology ◆ Duality ◆ Morse Functions ◆ C Computational

◆ Persistent Topology: Persistence ◆ Stability ◆ *Applications* ◆ *References* ◆ *Index*

2013	256 pp	Paperback
978-1-4704-0928-9		₹ 1,160.00

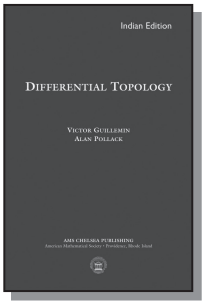
Differential Geometry: Curves – Surfaces – Manifolds (Third Edition)

Wolfgang Kühnel
University of Stuttgart, Stuttgart, Germany

See page 90

Differential Topology AMS PRINT ON DEMAND

Victor Guillemin, Alan Pollack



Differential Topology provides an elementary and intuitive introduction to the study of smooth manifolds. In the years since its first publication, Guillemin and Pollack's book has become a standard text on the subject. It is a jewel of mathematical exposition, judiciously picking exactly the right mixture of detail and generality to display the richness within. The text is mostly self-contained, requiring only undergraduate analysis and linear algebra. By relying on a unifying idea – transversality – the authors are able to avoid the use of big machinery or ad hoc techniques to establish the main results. In this way, they present intelligent treatments of important theorems, such as the Lefschetz fixed-point theorem, the Poincaré–Hopf index theorem, and Stokes theorem. The book has a wealth of exercises of various types. Some are routine explorations of the main material. In others, the students are guided step-by-step through proofs of fundamental results, such as the Jordan–Brouwer separation theorem. An exercise section in Chapter 4 leads the student through a construction of de Rham cohomology and a proof of its homotopy invariance. The book is suitable for either an introductory graduate course or an advanced undergraduate course.

2017	240 pp	Paperback
978-1-4704-3727-5		₹ 1,270.00

Elementary Topology: Problem Textbook AMS

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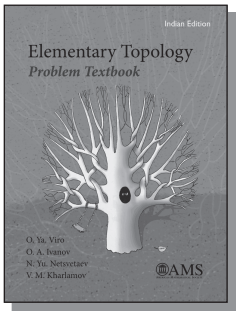
N Yu Netsvetaev
St. Petersburg State University, Russia

V M Kharlamov
University Louis Pasteur, Strasbourg, Cedex, France



This textbook on elementary topology contains a detailed introduction to general topology and an introduction to algebraic topology via its most classical and elementary segment centered at the notions of fundamental group and covering space.

The book is tailored for the reader who is determined to work actively. The proofs of theorems are separated from their formulations and are gathered at the end of each chapter. This makes the book look like a pure problem book and encourages the reader to think through each formulation. A reader who prefers a more traditional style can either find the proofs at the end of the chapter or skip them altogether. This style also caters to the expert who needs a handbook and prefers formulations not overshadowed by proofs. Most of the proofs are simple and easy to discover.

The book can be useful and enjoyable for readers with quite different backgrounds and

interests. The text is structured in such a way that it is easy to determine what to expect from each piece and how to use it. There is core material, which makes up a relatively small part of the book. *The core material is interspersed with examples, illustrative and training problems, and relevant discussions*.

The reader who has mastered the core material acquires a strong background in elementary topology and will feel at home in the environment of abstract mathematics. *With almost no prerequisites (except real numbers), the book can serve as a text for a course on general and beginning algebraic topology*.

Contents: General topology: Structures and spaces ◆ Continuity ◆ Topological properties ◆ Topological constructions ◆ Topological algebra ◆ Elements of algebraic topology: Fundamental group ◆ Covering spaces and calculation of fundamental groups ◆ Fundamental group and maps ◆ Cellular techniques ◆ Hints, comments, advices, solutions, and answers ◆ *Bibliography* ◆ *Index*

2012	**424 pp**	**Paperback**
978–0–8218–8726–4		**₹ 1,390.00**

Elements of Combinatorial and Differential Topology

AMS

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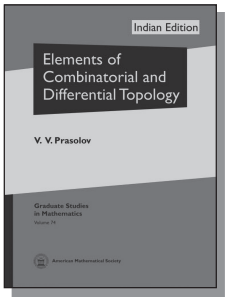


Modern topology uses very diverse methods. This book is devoted largely to methods of combinatorial topology, which reduce the study of topological spaces to investigations of their partitions into elementary sets, and to methods of differential topology, which deal with smooth manifolds and smooth maps. Many topological problems can be solved by using either of these two kinds of methods, combinatorial or differential. In such cases, both approaches are discussed.

One of the main goals of this book is to advance as far as possible in the study of the properties of topological spaces (especially manifolds) without employing complicated techniques. This distinguishes it from the majority of other books on topology.

The book contains many problems; almost all of them are supplied with hints or complete solutions.

Contents: *Preface* ◆ *Notation* ◆ *Basic Definitions* ◆ Graphs ◆ Topological and Geometric Properties of Graphs ◆ Homotopy Properties of Graphs ◆ Graph Invariants ◆ Topology in Euclidean Space ◆ Topology of Subsets of Euclidean Space ◆ Curves in the Plane ◆ The Brouwer Fixed Point Theorem and Sperner's Lemma ◆ Topological Spaces ◆ Elements of General Topology ◆ Simplicial Complexes ◆ CW-Complexes ◆ Constructions ◆ Two-Dimensional Surfaces, Coverings, Bundles, and Homotopy Groups ◆ Two-Dimensional Surfaces ◆ Coverings ◆ Graphs on Surfaces and Deleted Products of Graphs ◆ Fibrations and Homotopy Groups ◆ Manifolds ◆ Definition and Basic Properties ◆ Tangent Spaces ◆ Embeddings and Immersions ◆ The Degree of a Map ◆ Morse Theory ◆ Fundamental Groups ◆ CW-Complexes ◆ The Seifert–van Kampen Theorem ◆ Fundamental Groups of Complements of Algebraic Curves ◆ Hints and Solutions ◆ *Bibliography* ◆ *Index*

2014	**348 pp**	**Paperback**
978–1–4704–1915–8		**₹ 1,525.00**

First Course in Topology, A: Continuity and Dimension

AMS

John McCleary
Vassar College, Poughkeepsie, USA

How many dimensions does our universe require for a comprehensive physical description? In 1905, Poincaré argued philosophically about the necessity of the three familiar dimensions, while recent research is based on 11 dimensions or even 23 dimensions. The notion of dimension itself presented a basic problem to the pioneers of topology. Cantor asked if dimension was a topological feature of Euclidean space. To answer this question, some important topological ideas were introduced by Brouwer, giving shape to a subject whose development dominated the twentieth century.The basic notions in topology

are varied and a comprehensive grounding in point-set topology, the definition and use of the fundamental group, and the beginnings of homology theory requires considerable time. *The goal of this book is a focused introduction through these classical topics, aiming throughout at the classical result of the Invariance of Dimension. This text is based on the author's course given at Vassar College and is intended for advanced undergraduate students. It is suitable for a semester-long course on topology for students who have studied real analysis and linear algebra. It is also a good choice for a capstone course, senior seminar, or independent study.*

Contents: *Introduction* ⋄ A Little Set Theory ⋄ Metric and Topological Spaces ⋄ Geometric Notions ⋄ Building New Spaces from Old ⋄ Connectedness ⋄ Compactness ⋄ Homotopy and the Fundamental Group ⋄ Computations and Covering Spaces ⋄ The Jordan Curve Theorem ⋄ Simplicial Complexes ⋄ Homology ⋄ *Bibliography* ⋄ *Notation Index* ⋄ *Subject Index*

2011	**224 pp**	**Paperback**
978–0–8218–6893–5		**₹ 1,020.00**

Mapping Degree Theory

AMS

Enrique Outerelo
Universidad Complutense de Madrid, Spain

Jesús M Ruiz
Universidad Complutense de Madrid, Spain

This textbook treats the classical parts of mapping degree theory, with a detailed account of its history traced back to the first half of the 18th century. After a historical first chapter, the remaining four chapters develop the mathematics. An effort is made to use only elementary methods, resulting in a self-contained presentation. Even so, the book arrives at some truly outstanding theorems: the classification of homotopy classes for spheres and the Poincaré-Hopf Index Theorem, as well as the proofs of the original formulations by Cauchy, Poincaré, and others.

Although the mapping degree theory you will discover in this book is a classical subject, the treatment is refreshing for its simple and direct style. The straightforward exposition is accented by the appearance of several uncommon topics: tubular neighborhoods without metrics, differences between class 1 and class 2 mappings, Jordan Separation with neither compactness nor cohomology, explicit constructions of homotopy classes of spheres, and the direct computation of the Hopf invariant of the first Hopf fibration.

The book is suitable for a one-semester graduate course. There are 180 exercises and problems of different scope and difficulty.

Contents: *Preface* ⋄ History ⋄ Manifolds ⋄ The Brouwer-Kronecker degree ⋄ Degree theory in Euclidean spaces ⋄ The Hopf Theorems ⋄ Names of mathematicians cited ⋄ Historical references ⋄ *Bibliography* ⋄ *Symbols* ⋄ *Index*

2012	**256 pp**	**Paperback**
978–0–8218–8714–1		**₹ 1,395.00**

Twenty–Four Hours of Local Cohomology

AMS

Srikanth B Iyengar
University of Nebraska, Lincoln, USA

Graham J Leuschke
Syracuse University, USA

Anton Leykin
Institute for Mathematics and Its Applications, Syracuse, USA

Claudia Miller
Syracuse University, USA

Ezra Miller
University of Minnesota, Minneapolis, USA

Anurag K Singh
University of Utah, Salt Lake City, USA

Uli Walther
Purdue University, West Lafayette, USA

This book is aimed to provide an introduction to local cohomology which takes cognizance of the breadth of its interactions with other areas of mathematics. It covers topics such as the number of defining equations of algebraic sets, connectedness properties of algebraic sets, connections to sheaf cohomology and to de Rham cohomology, Gröbner bases in the commutative setting as well as for D-modules, the Frobenius morphism and characteristic p methods, finiteness properties of local cohomology modules, semigroup rings and polyhedral geometry, and

hypergeometric systems arising from semigroups. The book begins with basic notions in geometry, sheaf theory, and homological algebra leading to the definition and basic properties of local cohomology. Then it develops the theory in a number of different directions, and draws connections with topology, geometry, combinatorics, and algorithmic aspects of the subject.

Contents: Introduction ⋄ Basic Notions ⋄ Cohomology ⋄ Resolutions and Derived Functors ⋄ Limits ⋄ Gradings, Filtrations, and Gröbner Bases ⋄ Complexes from a Sequence of Ring Elements ⋄ Local Cohomology ⋄ Auslander-Buchsbaum Formula and Global Dimension ⋄ Depth and Cohomological Dimension ⋄ Cohen-Macaulay Rings ⋄ Gorenstein Rings ⋄ Connections with Sheaf Cohomology ⋄ Projective Varieties ⋄ The Hartshorne-Lichtenbaum Vanishing Theorem ⋄ Connectedness ⋄ Polyhedral Applications ⋄ D-modules ⋄ Local Duality Revisited ⋄ De Rham Cohomology ⋄ Local Cohomology over Semigroup Rings ⋄ The Frobenius Endomorphism ⋄ Curious Examples ⋄ Algorithmic Aspects of Local Cohomology ⋄ Holonomic Rank and Hypergeometric Systems ⋄ *Appendix: Injective Modules and Matlis Duality* ⋄ *Bibliography* ⋄ *Index*

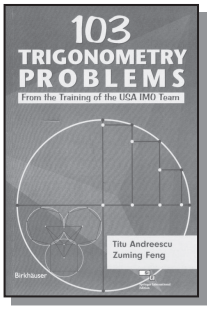
2011	**304 pp**	**Paperback**
978–0–8218–6883–6		**₹ 1,590.00**

Trigonometry

103 Trigonometry Problems

Titu Andreescu
American Mathematics Competitions, University of Nebraska, Lincoln, USA

Zuming Feng
Philips Exeter Academy, Department of Mathematics, Exeter, USA

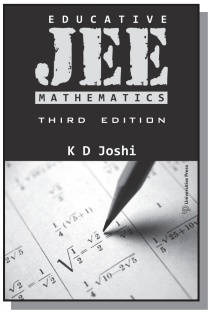


103 Trigonometry Problems contains carefully selected problems and solutions used in the training and testing of the USA International Mathematical Olympiad (IMO) team. Though many problems may initially appear impenetrable to the novice, most can be solved using only elementary high school mathematics techniques. The key features of this book are Gradual progression in problem difficulty builds and strengthens mathematical skills and techniques. Basic topics include trigonometric formulas and identities, their applications in the geometry of the triangle, trigonometric equations and inequalities and substitutions involving trigonometric functions. Problem-solving tactics and strategies, along with practical test taking techniques, provide in-depth enrichment and preparation for possible participation in various mathematical competitions. Comprehensive introduction (first chapter) to trigonometric functions, their relations and functional properties and their applications in the Euclidean plane and solid geometry expose advanced students to college level material.

2005	**232 pp**	**Paperback**
978–81–8128–339–9		**₹ 725.00**

Educative JEE (Third Edition)

K D Joshi
Adjunct Faculty, Department of Mathematics,
College of Engineering, Pune, India



The Joint Entrance Examination (JEE), the gateway to the IITs—India's prestigious institutes of learning—is considered as one of the toughest examinations conducted in India. Inevitably, there is competition to succeed in it. While such a competition is not bad in itself, the undesirable consequence is that in the mad rush to solve problems, the educative value of a problem is often lost. The thought process of students is thus skewed into solving problems (mostly by analogy) without thoroughly understanding the basic concepts underlying the problems and without a corresponding development of the thinking ability. Consequently, they are often unable to offer logical negation of a statement, even though they are intellectually capable of it.

This book is an attempt to lay before students both the concepts as well as the process of solving problems at the JEE. The problems have been collected mostly from JEE papers ranging over a period of two decades. The thrust is not so much on solving the problems as in the assimilation of the theory behind them and learning a few related new concepts. The solutions then come as natural corollaries. The book also contains some helpful tips aimed at sharpening the thinking ability and increasing the mathematical maturity of the student. New problems and an occasional new solution to an existing problem were added in the second edition. In this edition, two appendices, one on matrices and the other on solid coordinate geometry, have been added in view of the changes in JEE syllabus. Further, all the errors in the earlier two editions, listed as errata in the author's blog, have been corrected, and occasionally, a new solution to an existing problem has been included.

2015	1100 pp	Paperback
978–81–7371–945–5		₹ 1,200.00

Math Problems Notebook, The

Valentin Boju & Louis Funar

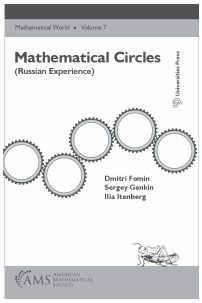
The Math Problems Notebook is a collection of nontrivial, unconventional problems requiring deep insight and imagination reminiscent of those discussed at Sunday Math Circles. These circles have become a place for disseminating beautiful mathematics at an elementary level for college students who have a common passion for mathematics.

The problems cover many topics, including number theory, algebra, combinatorics, geometry and analysis, of varying levels of difficulty. The presentation of each topic begins with simple exercises and follows with more difficult problems, challenging enough even for the experienced problem solver. The easier problems focus on basic methods and tools, while the *more advanced problems develop problem-solving techniques, intuition and promote further research.*

2010	248 pp	Paperback
978–81–8489–527–8		₹ 700.00

Mathematical Circles (Russian Experience)

Dmitri Fomim, Sergey Genkin and lliaItenberg



It is a book produced by a remarkable cultural circumstance in the former Soviet Union which fostered the creation of groups of students, teachers, and mathematicians called "Mathematical Circles". The work is predicated on the idea that studying mathematics can generate the same enthusiasm as playing a team sport—without necessarily being competitive. This book is intended for both students and teachers who love mathematics and want to study its various branches beyond the limits of the school curriculum. It is also a book of mathematical recreations and, at the same time, a book containing vast theoretical and problem material in main areas of what authors consider to be "extracurricular mathematics".

1998	**288 pp**	**Paperback**
978–81–7371–115–2		**₹ 745.00**

Mathematical Olympiad Challenges (Second Edition)

Titu Andreescu
American Mathematics Competitions, University of Nebraska, Lincoln, USA

Răzvan Gelca
Texas Tech. University, Department of Mathematics and Statistics, Lubbock, USA

This is a rich collection of problems put together by two experienced and well-known professors of the US International Mathematical Olympiad Team. Hundreds of beautiful, challenging and instructive problems from algebra, geometry, trigonometry, combinatorics and number theory are clustered by topic into self-contained sections with solutions provided separately. All sections start with an essay discussing basic facts and one or two representative examples. A list of carefully chosen problems follows. Additionally, historical insights and asides are presented to stimulate further inquiry. The emphasis throughout is on encouraging readers to move away from routine exercises and memorised algorithms toward creative solutions to open-ended problems.

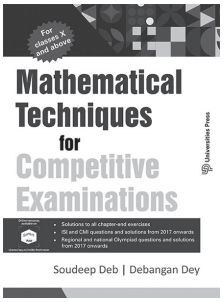
2014	**304 pp**	**Paperback**
978–87–3221–485–4		**₹ 695.00**

Mathematical Techniques for Competitive Examinations

NEW

Soudeep Deb
Assistant Professor, Indian Institute of Management Bangalore, Bengaluru, India

Debangan Dey
Visiting Fellow, National Institute of Mental Health, Bethesda, Maryland, USA



This is a problem-based book aimed at high-school students interested in mathematical topics related to the ISI and CMI entrance tests as well as Mathematics Olympiads. This book will help students in designing a well-planned pathway to tackle complicated problems from topics such as number theory, combinatorics, algebra, calculus, Euclidean and coordinate geometry, probability and statistics. The problem-solving strategies and pointers described here will help students become confident in mathematics and pave the way to attaining success.

Salient features:

- For students appearing for the ISI and CMI entrance exams as well as Mathematics Olympiads
- Key results at the beginning of every chapter, listing the important definitions, theorems,

identities, algorithms, principles, functions and formulae
- Solved examples showcasing different applications of the key results
- Useful tips in the form of tricks and techniques that can be used to solve problems
- Chapter-end exercises comprising multiple choice questions with solutions and subjective questions with hints
- Solved questions from the 2019, 2020 and 2021 ISI B.Math, ISI B.Stat and CMI BSc Math question papers
- Android app with solutions to all chapter-end exercises, questions and solutions from ISI and CMI question papers from 2017 onwards, and questions and solutions from regional and national Olympiads from 2017 onwards

Contents: *Preface* ◆ *Acknowledgements* ◆ Number Theory ◆ Combinatorics ◆ Algebra ◆ Calculus ◆ Euclidean Geometry ◆ Coordinate Geometry ◆ Probability and Statistics ◆ Miscellaneous ◆ *Appendix: Previous Years' Subjective Questions and Solutions*

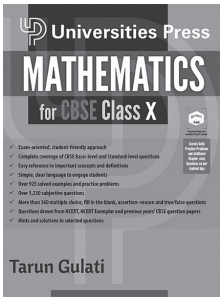
2023	**360 pp**	**Paperback**
978-93-93330-10-9		**₹ 625.00**

Mathematics for CBSE Class X

NEW

Tarun Gulati

Director, EduCare Academy



This book covers the entire CBSE syllabus for Mathematics for Class X. With this reader-friendly guide, students can expect to master the fundamental and important concepts of the subject and also learn how to apply these concepts to solve problems.

Using a mix of definitions, worked-out examples, proofs and different types of exercises, this invaluable aid will help engage and develop the students' interest in Mathematics and also enable them to excel in the examination.

Salient features:
- Over 925 solved examples and practice problems
- Over 1,230 subjective questions
- More than 560 multiple choice, fill in the blank, assertion–reason and true/false questions
- Questions drawn from NCERT, NCERT Exemplar and previous years' CBSE question papers
- Hints and solutions to selected questions
- Android app with practice problems, additional exercises and more
- Video lectures available at www.universitiespress.com/mathsclassX

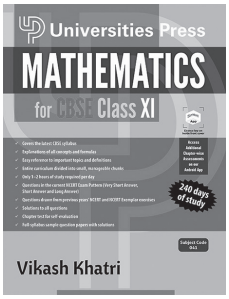
2022	**780 pp**	**Paperback**
978-93-89211-69-6		**₹ 650.00**

Mathematics for CBSE Class XI

NEW

Vikash Khatri

Guest Faculty, Vedic Mathematics, Centre for Vedic Science, BHU, Varanasi



This book is a complete and comprehensive preparation resource for students of Class XI studying for the CBSE exams. It provides clear and concise explanations and coverage of all topics specified by NCERT, offers a multitude of problems drawn from the current and previous years' question papers as per the current NCERT Exam Pattern, and presents solutions to every single problem. With this, students are certain to be successful in achieving their ambitions.

Salient features:
- The entire curriculum has been divided into small, manageable chunks corresponding to 240 days so that students can complete the content for that day in 1–2 hours of study

- Solutions to all problems have been provided for conceptual understanding of the theoretical and numerical portions of each chapter (there is no unsolved exercise)
- As per the NCERT Exam Pattern, questions are divided into the following types: Very Short Answer (VSA): Objective: 1-Mark Questions; Short Answer (SA): 2-Mark Questions; Long Answer I (LA-I): 4-Mark Questions; Long Answer II (LA-II): 6-Mark Questions
- Revision days are provided for individual chapters or groups of related chapters so that students can recapitulate all the topics they have studied thus far
- Unit tests are included at periodic intervals, with complete, detailed solutions, exactly as per the NCERT Exam Pattern
- Detailed solutions and in-depth explanations of all NCERT unsolved exercises and NCERT Exemplar problems are given
- Ten full-syllabus sample question papers are provided, with solutions
- This book will also be very helpful for students of various state boards and provides a strong foundation for students preparing for IIT-JEE and other engineering entrance examinations
- The Android app accompanying this book contains additional chapter-wise questions

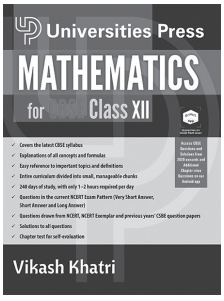
2022	796 pp	Paperback
978–93–93330–09–3		₹ 1050.00

Mathematics for CBSE Class XII

NEW

Vikash Khatri

Guest Faculty, Vedic Mathematics, Centre for Vedic Science, BHU, Varanasi



This book is a complete and comprehensive preparation resource for students of Class XII studying for the CBSE Board exams. It provides clear and concise explanations and coverage of all topics specified by NCERT, offers a multitude of problems drawn from the current and previous years' question papers as per the current NCERT Exam Pattern, and presents solutions to every single problem. With this, students are certain to be successful in achieving their ambitions.

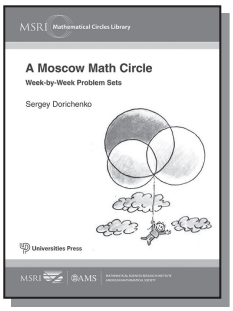
Salient features:

- The entire curriculum has been divided into small, manageable chunks corresponding to 240 days so that students can complete the content for that day in 1–2 hours of study
- Solutions to all problems have been provided for conceptual understanding of the theoretical and numerical portions of each chapter (there is no unsolved exercise)
- As per the NCERT Exam Pattern, questions are divided into the following types: Very Short Answer (VSA): Objective: 1-Mark Questions; Short Answer (SA): 2-Mark Questions; Long Answer I (LA-I): 4-Mark Questions; Long Answer II (LA-II): 6-Mark Questions
- At the end of each chapter, a test is included, with complete, detailed solutions, exactly as per the NCERT Exam Pattern
- At the end of each chapter, a revision day is provided so that students can recapitulate all the topics they have studied in that chapter
- Detailed solutions and in-depth explanations of all NCERT unsolved exercises and NCERT Exemplar problems are given
- Solutions and step-by-step explanations of all CBSE questions are provided
- This book will also be very helpful for students of various state boards and provides a strong foundation for students preparing for IIT-JEE and other engineering entrance examinations
- The Android app accompanying this book contains CBSE questions and solutions from 2020 onwards and additional chapter-wise questions

2022	1040 pp	Paperback
978–93–89211–86–3		₹ 925.00

Moscow Math Circle, A

Sergey Dorichenko
Moscow Schools 57 and 179, Moscow, Russia



Moscow has a rich tradition of successful math circles, to the extent that many other circles are modeled on them. This book presents materials used during the course of one year in a math circle organized by mathematics faculty at Moscow State University, and also used at the mathematics magnet school know as Moscow School Number 57.

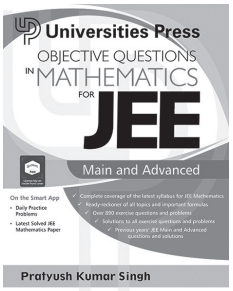
Each problem set has a new topic, Offering problems in a range of difficulty levels. This time-tested pattern has proved its effectiveness in engaging all students and helping them master new material while building on earlier knowledge.

The introduction describes in detail how the math circles at Moscow State University are run. Dorichenko describes how the early sessions differ from later session, how to choose problems, and what sort of difficulties may arise when running a circle. The book also includes a selection of problems used in the competition known as the Mathematical Maze, a mathematical Circle, which is run in the Russian style.

2016 **264 pp** **Paperback**
978-81-7371-993-6 **₹ 595.00**

Objective Questions in Mathematics for JEE Main and Advanced NEW

Pratyush Kumar Singh
Founder of an IIT coaching centre in Ranchi, India



This book has been designed to provide students with intensive as well as extensive practice of the questions and problems they will encounter in the JEE Mathematics exams. The aim of this book is to improve and enhance the aptitude, proficiency and problem-solving ability of students in Mathematics to enable them to crown their endeavours with success.

Salient features:

- Key concepts at the beginning of every chapter to summarise the important principles
- Key equations and formulas presented for every topic
- Detailed, step-by-step solutions to all questions and problems
- Lavish use of figures to illustrate concepts and problems
- Appendices with previous years' JEE Main and Advanced solved questions
- Android app with practice problems and solutions to the latest JEE Mathematics paper
- Video lectures available at www.universitiespress.com/jeemaths

Application of Derivatives ◆ Indefinite Integration ◆ Definite Integration ◆ Differentiation of an Integral ◆ Area Between Curves ◆ Sum of a Series and Definite Integral ◆ Differential Equations ◆ **PART III:** COORDINATE GEOMETRY ◆ Straight Line ◆ Circle ◆ Parabola ◆ Ellipse ◆ Hyperbola ◆ 3D Geometry ◆ Appendix

2022 **452 pp** **Paperback**
978-938-9211-87-0 **₹ 475.00**

Encyclopaedia

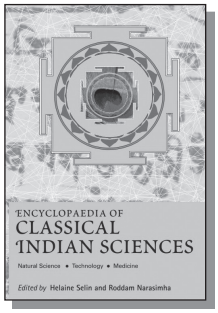
Encyclopaedia of Classical Indian Sciences

Helaine Selin

Formerly Professor, Hampshire College, Amherst, USA

Roddam Narasimha

DST Year–of–Science Professor, Jawaharlal Nehru Centre for Advanced Science Research, Bengaluru, India



India's contributions to science and technology are among the most ancient and influential in the world. In mathematics, the decimal place value system with zero as a numeral, used universally today, owes its origin to India. The science of Ayurveda, which has been practised for millennia in India, is now gaining wider acceptance even as many ancient remedies are turned into modern drugs. Indian astronomical computations, ritual geometry, brick technology and metallurgical innovations have been among the finest achievements in the world of science and technology.

Encyclopaedia of Classical Indian Sciences is an attempt to provide an authentic account of natural science, technology and medicine as practised by Indians and other South Asians. It also includes biographical articles on many ancient Indian scientists, and some articles (polemic in nature) on the history of Indian science and technology, such *as the essay on the effects of colonialism. All articles are contributions of acknowledged authorities on their subject drawn from across the world*.

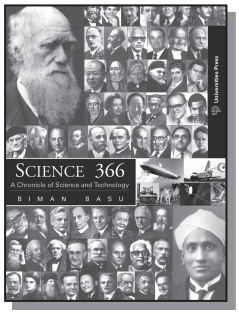
Available in print and e-book formats.
For details, visit www.universitiespress.com.

2007	492 pp	Hardback
978–81–7371–555–6		₹1,600.00

Science 366: A Chronicle of Science and Technology

Biman Basu

Formerly Editor, Science Reporter, Council of Scientific and Industrial Research (CSIR), New Delhi, India



Dates have an important place in our lives—not only are they historical occasions that we observe every year but they are also milestones to measure our growth in age, prosperity and wisdom. Therefore, dates in the scientific field can be used as a measure of progress in our quest for the unknown—dates when some important scientific discovery was made or some famous scientist was born. There are also dates that mark important breakthroughs in our understanding of the universe around us—new discoveries and new inventions that have changed our life.

This book can be considered a diary of scientific events—both Indian and international—including dates related to scientists and their works; inventors and their inventions; scientific organisations; and important scientific occurrences.

The entries are arranged chronologically. An entry for the date of birth of a scientist or inventor gives a brief biography of the person, while an entry for the date of founding or inauguration of a scientific institution gives a brief summary of the activities and achievements of the institution. All the entries are cross-referenced for easy navigation.

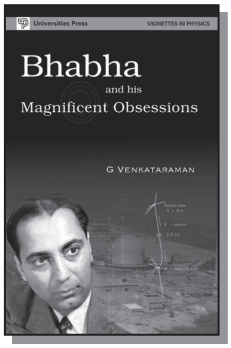
Available in print and e-book formats.
For details, visit www.universitiespress.com.

2008	**712 pp**	**Paperback**
978-81-7371-607-2		**₹ 2,160.00**

Biographies

Bhabha and His Magnificent Obsessions

G Venkataraman



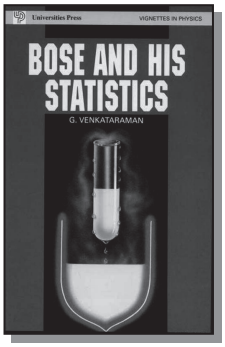
This book is about the remarkable scientist Homi Jehangir Bhabha who, at the age of eighteen, went to Cambridge to study physics and started his research career there. In 1939, when Bhabha came to India on a short vacation, he was forced to stay on as the Second World War broke out. This was, of course, a blessing for the country as he later steered the country's scientific destiny. The book records Bhabha's contributions which were in many dimensions and not just purely scientific.

Available in print and e-book formats.
For details, visit www.universitiespress.com.

1994	**222 pp**	**Paperback**
978-81-7371-007-0		**₹ 575.00**

Bose and His Statistics

G Venkataraman



This book describes a monumental discovery made by Satyendranath Bose. It also helps the reader take a step closer in understanding Bose—the scientist—and describes the events that surround this exciting discovery.

Available in print and e-book formats.
For details, visit www.universitiespress.com.

1992	**136 pp**	**Paperback**
978-81-7371-036-0		**₹ 395.00**

Chandrasekhar and His Limit

G Venkataraman

This is a heartwarming and very inspiring story about Subrahmanyam Chandrasekhar, the most distinguished mathematical physicist India has produced. In a long and remarkable career, Chandrasekhar has done many outstanding things but this book concentrates mostly on one of them, namely, the discovery of the Chandrasekhar Limit.

Available in print and e-book formats.
For details, visit www.universitiespress.com.

1992	**144 pp**	**Paperback**
978-81-7371-035-3		**₹ 565.00**

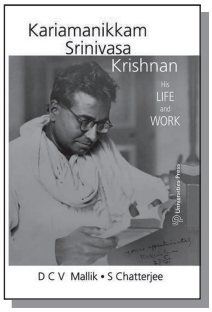
Kariamanikkam Srinivasa Krishnan: His Life and Work

D C V Mallik

Formerly Professor, Indian Institute of Astrophysics, Bengaluru, India

S Chatterjee

Professor, Indian Institute of Astrophysics, Bengaluru, India



The first four decades of the 20th century were glorious years for science, especially physics. Our view of the physical world changed forever with the emergence of quantum mechanics and Einstein's formulation of the theory of relativity. India too contributed significantly to this scientific revolution with the discoveries made by S N Bose, C V Raman and M N Saha, all in the space of about a decade. *Kariamanikkam Srinivasa Krishnan (1898-1961)* belonged to the same illustrious group. He was perhaps the only Indian physicist of his generation who was equally adept in theory and experiment. Besides a life of excellence in science, Krishnan's destiny led him to be an able science policy maker and administrator. *He was also a great teacher, a humanist and a scholar of Sanskrit, Tamil literature and philosophy.*

This biography, besides being a detailed and meticulously documented account of Krishnan's life and his scientific work, is also an *exciting account of the history of Indian science of the period. The source material of this work, most of which are being used for the first time, comes from the private papers of K S Krishnan that had remained in the custody of his family.*

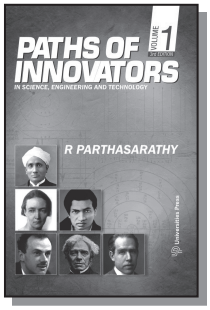
Contents: *Foreword* ◆ *Acknowledgement* ◆ *Prologue* ◆ Background ◆ Childhood and Schooling ◆ College Years ◆ Science Education and Its Beginnings in Calcutta ◆ Calcutta ◆ Scattering of Light ◆ Discovery of the Raman Effect ◆ Dacca ◆ Bonds of Magnetism I: The Dacca Phase ◆ Winds of Change ◆ Bonds of Magnetism II: The Calcutta Phase ◆ Graphite and Its anomalous Diamagnetism ◆ Honours and Offers ◆ The Physics Chair at Allahabad ◆ Rejuvenating Physics in Allahabad ◆ The Widening Vista ◆ Krishnan in Delhi ◆ NPL: The Initial Years ◆ Oscillating Lattices, Emitting Surfaces, Heated Tubes ◆ The Broader Stage ◆ Into the Twilight ◆ *Appendix* ◆ *Primary Sources* ◆ *Bibliography* ◆ *Index*

2012	**516 pp**	**Hardback**
978-81-7371-748-2		**₹ 2,040.00**

2011	**516 pp**	**Paperback**
978-81-7371-749-9		**₹ 1,560.00**

Paths of Innovators, Volume 1

R Parthasarathy
Formerly Professor, Department of Physics, IIT Madras, Chennai, India



This is the first volume of a set of two volumes. It comprises a collection of scientists' lives, their struggles, their achievements and their laurels. The scientists have been grouped under five disciplines—Engineering, Physics, Mathematics, Chemistry and Life Sciences. The reader meets people from various backgrounds—those with insufficient schooling, those with little money, those born into aristocracy, those with science in their blood, those battling with grave illnesses, those who moved from one discipline to another (as different as possible from each other); ultimately culminating in path-breaking scientific discoveries. *The aim of these brief biographical sketches is to inspire a wider audience to take up the noble pursuit of pure sciences.*

Contents: *Engineering:* Appleton, Edward ◆ Arago, Jean ◆ Babbage, Charles ◆ Baird, John ◆ Callendar, Hugh ◆ Carnot, Sadi ◆ Cotton, Arthur ◆ Diesel, Rudolf ◆ Esaki, Leo ◆ Faraday, Michael ◆ Fulton, Robert ◆ Giaever, Ivar ◆ Haber, Fritz ◆ Haggerty, Patrick ◆ Heaviside, Oliver d Henry, Joseph ◆ Hertz, Heinrich ◆ Karman, Theodore von ◆ Kelvin, Lord ◆ Krupp, Alfred ◆ Langmuir, Irving ◆ Marconi, Guglielmo ◆ Ohain, Hans von ◆ Shannon, Claude ◆ Taylor, GI ◆ Terzaghi, Karl ◆ Tesla, Nicola ◆ Steinmetz, Charles ◆ Stephenson, George ◆ Watt, James ◆ Whittle, Frank ◆ Zworykin, Vladimir

Physics: Becquerel, Henri ◆ Bohr, Niels ◆ Boltzmann, Ludwig ◆ Born, Max ◆ Bragg, William Lawrence ◆ Cavendish, Henry ◆ Chadwick, James ◆ Coulomb, Charles ◆ Crookes, William ◆ Dirac, Paul ◆ Doppler, Christian ◆ Fermi, Enrico ◆ Foucault, Jean ◆ Fraunhofer, Joseph ◆ Fresnel, August ◆ Heisenberg, Werner ◆ Helmholtz, Hermann ◆ Huygens, Christian ◆ Kapitza, Peter ◆ Mach, Ernst ◆ Millikan, Robert ◆ Pauli, Wolfgang ◆ Peltier, Jean Charles ◆ Planck, Max ◆ Raman, CV ◆ Roentgen, William ◆ Rutherford, Ernst ◆ Stefan, Josef ◆ van der Waals, Johannes ◆ Wien, Wilhelm ◆ Young, Thomas

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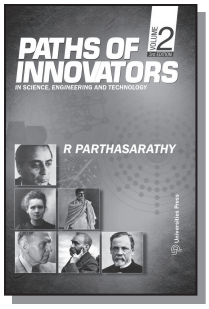
Chemistry: Arrhenius, Svante ◆ Avogadro, Amedeo ◆ Berthollet, Claude ◆ Berzelius, Jacob ◆ Black, Joseph ◆ Bunsen, Robert ◆ Dalton, John ◆ Dulong, Pierre ◆ Fourcroy, Antoine ◆ Gay-Lussac, Joseph ◆ Hodgkin, Dorothy ◆ Hofmann, August von ◆ Joliot-Curie, Irene ◆ Kekule, Friederich ◆ Lavoisier, Antoine ◆ Liebig, Justus von ◆ Mendeleev, Dmitri ◆ Perkin, William

2012 **456 pp** **Paperback**
978–81–7371–750–5 **₹ 1,195.00**

Paths of Innovators, Volume 2

R Parthasarathy
Formerly Professor, Department of Physics, IIT Madras, Chennai, India



This is the second volume of a set of two volumes. It comprises a collection of scientists' lives, their struggles, their achievements and their laurels. The scientists have been grouped under five disciplines—Engineering, Physics, Mathematics, Chemistry and Life Sciences. The reader meets people from various backgrounds—those with insufficient schooling, those with little money,

those born into aristocracy, those with science in their blood, those battling with grave illnesses, those who moved from one discipline to another (as different as possible from each other); ultimately culminating in path-breaking scientific discoveries. *The aim of these brief biographical sketches is to inspire a wider audience to take up the noble pursuit of pure sciences.*

Contents: *Engineering:* Ampere, Andre-Marie ◆ Benz, Karl ◆ Bessemer, Henry ◆ Bhabha, Homi ◆ Bosch, Carl ◆ Cayley, George ◆ Cockcroft, John ◆ Daimler, Gottlieb ◆ De Laval, Gustav ◆ Francis, James ◆ Grove, Andrew ◆ Guillemin, Ernst ◆ Kaplan, Victor ◆ Kelly, William ◆ Khosla, AN ◆ Korolov, Sergi ◆ Lienthal, Otto ◆ Mond, Ludwig ◆ Morse, Samuel ◆ Otto, Nikolous ◆ Parsons, Charles ◆ Pelton, Lester ◆ Prandtl, Ludwig ◆ Reynolds, Osborne ◆ Sarabhai, Vikram ◆ Seshu, Sundaram ◆ Sperry, Elmer ◆ Tata, JRD ◆ Vishveshwaraya, M ◆ Von Bekesy, Georg ◆ Westinghouse, George ◆ Wheatstone, Charles ◆ Wollaston, William ◆ Wright, Orville ◆ Wright, Wilbur

Physics: Blackett, PMS ◆ Blau, Mariette ◆ Bose, JC ◆ Bose, SN d Boyle, Robert ◆ Brewster, David ◆ Claussius, Rudolf ◆ Compton, Arthur ◆ Curie, Pierre ◆ de Broglie, Louis ◆ Ehrenfest, Paul ◆ Franck, James ◆ Gabor, Dennis ◆ Geiger, Hans ◆ Hahn, Otto ◆ Herzberg, Gerad ◆ Hess, Victor ◆ Kilby, Jack ◆ Kramers, Hendrik ◆ Krishnan, KS ◆ Landau, Lev ◆ Lawrence, Ernest ◆ Lenard, Philip ◆ Lenz, Henirich ◆ Lorentz, Hendrik ◆ Meitner, Lise ◆ Michelson, Albert ◆ Mosley, Henry ◆ Neel, Louis ◆ Oppenheimer, Robert ◆ Rabi, II ◆ Rayleigh, Lord ◆ Rotblat, Joesph ◆ Saha, MN ◆ Schrodinger, Erwin ◆ Seaborg, Glenn T ◆ Smith, George ◆ Sommerfeld, Arnold ◆ Stern, Otto ◆ Szilard, Leo ◆ Weber, Wilhelm ◆ Wilson, CTR

Mathematics: Bolyai, Janos ◆ Bolyai, Wolfgang ◆ Carbano, Gerolomo ◆ Cayley, Arthur ◆ Chebyshev, Pafulty ◆ D'Alembert, Jean ◆ de Moivre, Abraham ◆ De Morgan, Augustus ◆ Dirichlet, Peter ◆ Galileo, Galilei ◆ Green, George ◆ Hamilton, William ◆ Hermite, Charles ◆ Hubble, Edwin ◆ Jacobi, Carl ◆ Klein, Felix ◆ Kronecker, Leopold ◆ Lefschetz, Solomon ◆ Legendre, AM ◆ Louisville, Joseph ◆ Lyapunov, Alexander ◆ Mahalanobis, PC ◆ Moebius, August ◆ Monge, Gaspard ◆ Nash, John ◆ Pierce, Charles ◆ Pluecker, Julius ◆ Poisson, Simon ◆ Ranganathan, SR ◆ Steiner, Jakob ◆ Sylvester, James ◆ Taylor, Brook ◆ Von Neumann, John ◆ Weierstrass, Karl ◆ Whitehead, AN

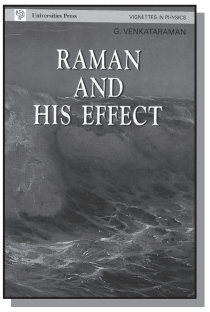
Chemistry: Curie, Marie ◆ Davy, Humphry ◆ Debye, Peter ◆ Fischer, Emil ◆ Ghosh, JC ◆ Gibbs, Willard ◆ Haber, Fritz ◆ Klaproth, Martin ◆ Kopp, Hermann ◆ Le Chatlier, Henry ◆ Lewis, GN ◆ Meyer, Victor ◆ Mitscherlich, Eilhard ◆ Nernst, Walther ◆ Nobel, Alfred ◆ Ostwald, Wilhelm ◆ Pauling, Linus ◆ Priestley, Joseph ◆ Ray, Acharya PC ◆ Seshadri, TR ◆ Soddy, Frederick ◆ Urey, Harold ◆ Van't Hoff, Jacobus ◆ Venkataraman K

Life Science: Banting, Frederick ◆ Eijkman, Christian ◆ Elion, Gertrude ◆ Eysenek, Hans ◆ Fleming, Alexander ◆ Franklin, Rosalind ◆ Hopkins, Frederik ◆ Huxley, Thomas ◆ Jenner, Edward ◆ Koch, Robert ◆ Landsteiner, Karl ◆ Laveran, Alphonse ◆ Linnaeus, Carl ◆ Lister, Joseph ◆ Manson, Patrick ◆ McClintock, Barbara ◆ Mendel, Gregor ◆ Pasteur, Louis ◆ Perutz, Max ◆ Ross, Ronald ◆ Rao, Y Subba ◆ Sahni, Birbal ◆ Salk, Jonas ◆ Sircar, Mahendralal

2012	544 pp	Paperback
978–81–7371–751–2		₹ 1,195.00

Raman and His Effect

G Venkataraman

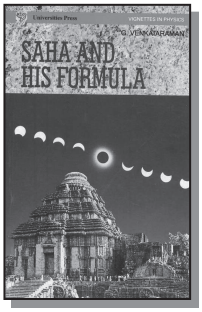


This book deals with the famous Scattering Effect discovered by Sir C. V. Raman. It gives us deep insights into the character of this famous scientist and vividly describes the circumstances surrounding the discovery.

1995	108 pp	Paperback
978–81–7371–008–7		₹ 425.00

Saha and His Formula

G Venkataraman



A great leap forward in unravelling the mysteries of the Sun occurred way back in 1920 when Meghnad Saha made an important discovery that paved the way for a systematic study of stellar atmospheres in general. This book is about that great discovery and the man who made it.

Available in print and e-book formats.
For details, visit www.universitiespress.com.

1995	**206 pp**	**Paperback**
978-81-7371-017-9		**₹ 425.00**

Wings of Fire: An Autobiography (Abridged, Special Student Edition with Exercises)

A P J Abdul Kalam
Former President of India

Arun Tiwari
Adjunct Professor, University of Hyderabad, Hyderabad, India

This simplified and abridged version now makes *Dr Kalam's* inspirational story accessible to students. A comprehensive glossary provides help in the understanding of technical terms. *This Special Student Edition includes exercises.*

2004	**144 pp**	**Paperback**
978-81-7371-548-8		**₹ 350.00**

Wings of Fire: An Autobiography

A P J Abdul Kalam
Former President of India

Arun Tiwari
Adjunct Professor, University of Hyderabad, Hyderabad, India

Avul Pakir Jainulabdeen Abdul Kalam, the son of a little-educated boat-owner in Rameswaram, Tamil Nadu, had an unparalleled career as a defence scientist, culminating in the highest civilian award of India, the *Bharat Ratna*. As chief of the country's defence research and development programme, Kalam demonstrated the great potential for dynamism and innovation that existed in seemingly moribund research establishments. This is the *story of Kalam's rise from obscurity and his personal and professional struggles, as well as the story of Agni, Prithvi, Akash, Trishul and Nag*—missiles that have become household names in India and have raised the nation to the level of a missile power of international reckoning. This is also the saga of independent India's struggle for technological self-sufficiency and defensive autonomy—a story as much about politics (domestic and international) as it is about science.

Available in print and e-book formats.
For details, visit www.universitiespress.com.

1999	**212 pp**	**Paperback**
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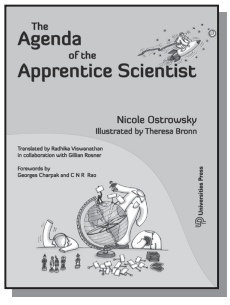
General Interest

Agenda of the Apprentice Scientist, The

Nicole Ostrowsky
Professor Emeritus, University of Nice Sophia Antipolis, France



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But most importantly, don't hesitate to play, draw, cut, construct, write and think—there is no better way to learn than through this maxim:

Tell me and I'll forget,
Show me and I may remember,
Involve me and I'll understand.

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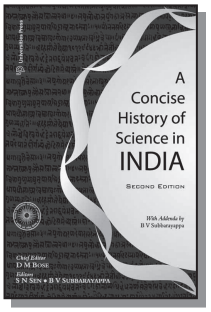
2012	**396 pp**	**Paperback**
978-81-7371-753-6		**₹ 1,125.00**

Concise History of Science in India, A
(Second Edition)

D M Bose (Ed.)
Formerly Director, Bose Institute, Kolkata, India

S N Sen (Ed.)
Formerly Registrar, Indian Association for the Cultivation of Science, Kolkata, India

B V Subbarayappa (Ed.)
Formerly Executive Secretary, Indian National Science Academy, New Delhi; Project Coordinator and Member Secretary, National Commission for the History of Science in India; Director, Discovery of India Project, at Nehru Centre, Mumbai, India



India's contributions in the field of science have been very influential in the development of human civilisation. The decimal place value system and the Ayurvedic way of life are just two well-known legacies of this ancient culture. Yet there are only a few books which provide an unbiased and authentic view of this world. One reason for this is that the study of Indian science through the ages involves the complex integration of the knowledge of many languages and diverse scientific disciplines. Through the years, there has been growing interest in this study as an important aspect in understanding man's interaction with nature, his material life and cultural patterns. The Indian National Science Academy, through its History of Science Board (1958) and the National Commission for the Compilation of History of Sciences in India (1967) renamed in 1989 as the Indian National Commission for History of Science sought further means to stimulate this interest among universities and scholars. The result was the publication of *A Concise History of Science in India.*

This book attempts to present a brief account of the development of science from early times to Independence, in one of the most ancient civilisations of the world. After nearly four decades since its publication, A Concise History of Science in India remains one of the most extensive and authentic account of Indian science through the ages. Yet further studies in the field have brought to light new material. This revised edition, taken up by B V Subbarayappa, one of the three original editors, seeks to integrate the new information with the knowledge already at hand.

2009	**980 pp**	**Paperback**
978-81-7371-619-5		**₹ 1,645.00**

Ever Upwards: ISRO in Images

P V Manoranjan Rao

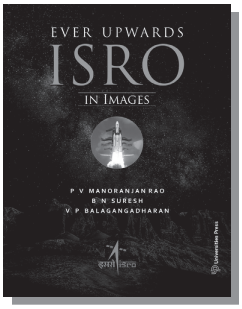
Formerly Group Director, Vikram Sarabhai Space Centre, ISRO

B N Suresh

Chancellor, Indian Institute of Space Science and Technology, Thiruvanthapuram, India; Formerly Director, Vikram Sarabhai Space Centre, ISRO

V P Balagangadharan

Formerly Scientist, Vikram Sarabhai Space Centre, ISRO



The Indian space programme has the unique distinction of being born in a place of worship: the St. Mary Magdalene Church in Thumba, a fishing hamlet near Thiruvananthapuram, the capital of Kerala. From those humble beginnings in 1963, the national space programme grew under the visionary guidance of Vikram Sarabhai and Satish Dhawan to become a technological giant, known today as the Indian Space Research Organisation (ISRO). Sarabhai created ISRO in 1969.

This year, 2019, marks the birth centenary of Sarabhai and the 50th anniversary of ISRO. This book celebrates the double anniversary through over 370 photographs, lovingly curated by the authors from a collection of 2000. Some of them have never before been seen by the public, while others are eye-catchingly beautiful.

The authors have worked on this book for over five years, always keeping abreast with the latest developments in ISRO: from its birth in a church in 1963 to Chandrayaan-2, whose launchis imminent.

This is the story of ISRO told through images. The pictures speak for themselves!

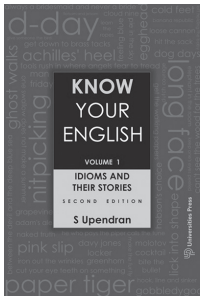
2019	**304 pp**	**Hardback**
978-93-89211-13-9		**₹ 4,560.00**

Know Your English, Volume 1: Idioms and Their Stories (Second Edition)

REVISED EDITION

S Upendran

Professor, Department of Materials Development, Testing and Evaluation, English and Foreign Languages University, Hyderabad, India



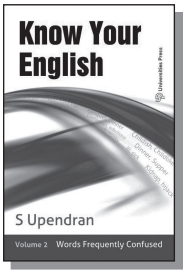
This is the first of our four-volumeseries based on Know Your English, the popular weekly columnpublished in The Hindu since 1982. Teachers, students and those whoare keen on honing their speakingand writing skills will find the seriesuseful. This enlarged and updatedsecond edition contains a selectionof 570 idioms. Each entry gives themeaning of the idiom, providesexamples of its use and, whereverpossible, traces its origins.The selections inthis book are from thosethat featured between1992 and 2018.

2022	**404 pp**	**Paperback**
978-93-86235-60-2		**₹ 835.00**

Know Your English, Volume 2: Words Frequently Confused

S Upendran

Professor, Department of Materials Development, Testing and Evaluation, English and Foreign Languages University, Hyderabad, India



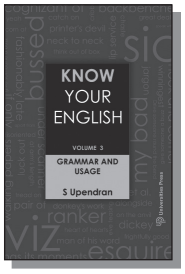
When an Indian decides to settle down in America, does he 'emigrate' or 'immigrate' to that country? What is the difference between 'it's' and 'its'? Should you refer to your fellow coworker as 'my elder colleague', or 'my older colleague'? *Words Frequently Confused*, the second volume in the four volume series, *Know Your English*, clears doubts such as these.

Like the first volume, *Idioms and Their Stories*, this book is based on S Upendran's popular weekly column *Know Your English*, published in *The Hindu*. It contains a selection of about 480 pairs of words that are frequently confused. Each entry gives the meaning of the words and points out the difference between them. Examples are also provided showing how the words can be used in everyday contexts. Some of the entries also contain information about the pronunciation and the etymology (origin) of the word.

2013	**416 pp**	**Paperback**
978–81–7371–730–7		**₹ 825.00**

Know Your English, Volume 3: Grammar and Usage

S Upendran



Do you enjoy being in 'crowdy' places? What is the plural of 'aircraft' and 'cattle'? Is it 'media are' or 'media is'? Do you have a 'soft spot' or a 'soft corner' for someone? Are you 'good at' or 'good in' cricket? Were you a 'topper' or 'ranker' in school? Why do software engineers want us to 'revert back' to them? Do you pay 'in cash' or 'by cash'? Does your house have a big backside?

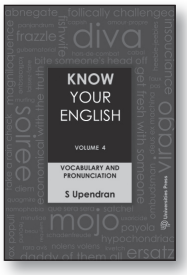
Grammar and Usage, is a practical reference guide that provides answers to such questions. The selections included in the book highlight some of the common errors that we Indians make when we use English.

Like the first and second volumes, this book is based on Upendran's popular weekly column, *Know Your English*, published in *The Hindu*. It contains a selection of over 650 entries, each dealing with an aspect of grammar/usage. Explanations have been provided in simple, jargon-free language.

2017	**444 pp**	**Paperback**
978–81–7371–731–4		**₹ 835.00**

Know Your English, Volume 4: Vocabulary and Pronunciation

S Upendran



Is 'tier' pronounced the same way as 'tyre'? Which syllable is stressed in 'baton'– the first or the second? How is the word 'danseuse' pronounced? Are you friends with the 'big cheese' on campus? When you watch a film, do youhave a sense of 'déjàvu'?

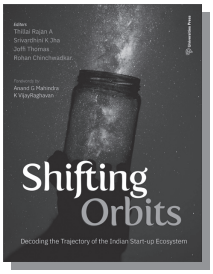
Vocabulary and Pronunciation is a practical reference guide that provides answers to such questions. The selections included in the book highlight some of the everyday words that we mispronounce when speaking in English. In addition, the book familiarises the reader with several hundred words and expressions used by native speakers of English in formalandinformal contexts.

Like the earlier three volumes, this book is based on Upendran's popular weekly column, *Know Your English*, published in *The Hindu*. It contains a selection of over 800 entries; an explanation of the meaning, pronunciation and etymology of each word has been provided.

2018	**500 pp**	**Paperback**
978–81–7371–732–1		**₹ 835.00**

Shifting Orbits: Decoding the Trajectory of the Indian Start-up Ecosystem

PRINT ON DEMAND



Online resources available

Thillai Rajan A

Professor, Department of Management Studies, Indian Institute of Technology Madras, Chennai, India and Associate, Mossavar Rahmani Center for Business and Government, Harvard Kennedy School, Harvard University, USA

Srivardhini K Jha

Associate Professor (Entrepreneurship), Indian Institute of Management Bangalore, Bengaluru, India

Joffi Thomas

Associate Professor (Marketing), Indian Institute of Management Kozhikode, Kozhikode, India

Rohan Chinchwadkar

Assistant Professor (Finance), Shailesh J Mehta School of Management, Indian Institute of Technology Bombay, Mumbai, India

In the new millennium, the shape of India's vibrant entrepreneurial economy has changed significantly to move towards one driven by technology and innovation. Today, India is one of the largest start-up and innovation hubs in the world, and the Indian start-up ecosystem has become an important contributor in our journey to become a $5 trillion economy.

Shifting Orbits chronicles the spectacular rise of the start-up landscape in India in four different sections: innovation, incubation, funding and industry perspectives.

- The first section dives deeper into understanding how India is faring on innovation-led entrepreneurship and delineates the challenges to be overcome.
- The next section explains how incubators provide a safe harbour for start-ups so that they can survive and flourish as viable businesses.
- For start-ups to be able to grow and create an impact, funding is critical – the third section examines the current funding scenario and lists the policy changes essential for its growth,
- The section on industry perspectives takes an analytical, practice-centred view of the growth of the Indian innovation ecosystem.

Taken together, *Shifting Orbits* is a comprehensive narrative on innovation and venturing in India and provides valuable insights on current trends and practices as well as the challenges and potential benefits for the future.

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Former President of India

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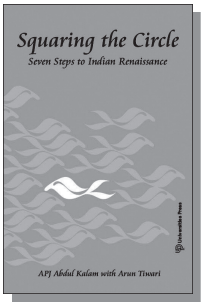

Dr Kalam calls for an Indian Renaissance, which he describes in seven steps involving the common people of the land, and in particular, the youth. He urges people to arise out of servitude to a vested ruling class, awake from the slumber of a passive democracy, and advance to manifest our destiny of a developed nation. He recommends that by turning inward and listening to the voice of our conscience, we can live a virtuous life and thereby build a strong and secure India.

Contents: *Prologue* ◆ *Introduction* ◆ *Acknowledgements* ◆ The Story of Socrates ◆ We Are All One ◆ Truth and Reconciliation ◆ Beyond Narrow Domestic Walls ◆ A World View is a Lens ◆ Ignited Minds ◆ Know Thyself ◆ Social Enterprise ◆ Istikhara ◆ Good to Great ◆ Re-energizing Relations ◆ Strength respects Strength ◆ Work, Bread, Water and Salt for All ◆ Livable Planet ◆ *Epilogue* ◆ *Index*

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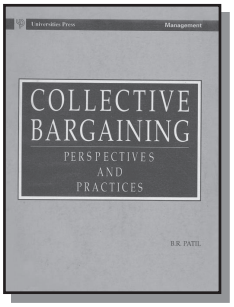

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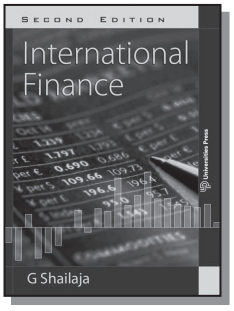

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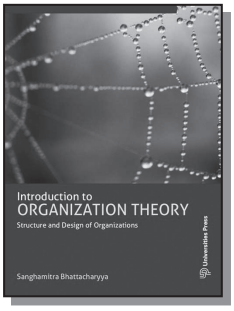

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This book explains the concept of organization theory, structure and design. The focus is on the structure and design of organizations, the theories underlying the design of structures, the effectiveness of organizational design in ensuring organizational survival and growth, and the management of organizational restructuring and change to prevent corporate decline and failure. Most standard textbooks on organizational theory currently in use are by foreign authors, and cite predominantly US or European examples. To address this lacuna, at least two Indian case studies have been discussed in each chapter and numerous examples of Indian organizations and their experiences have been included to explain concepts and theories.

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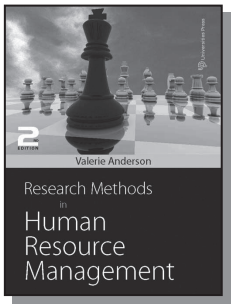

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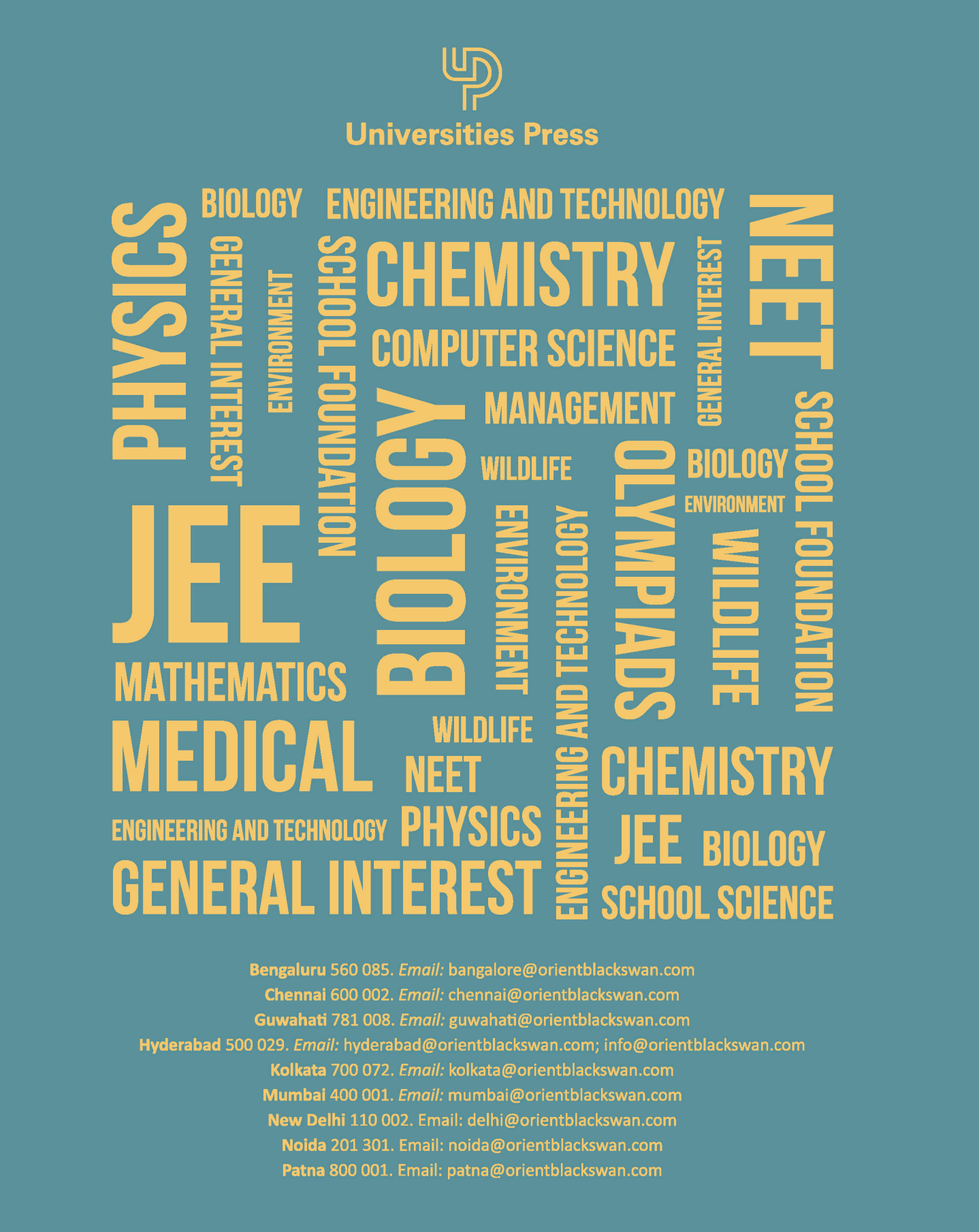

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