



Universities Press

Universities Press focusses on the publication of books in Science, Technology and Medicine.

In addition to independent publishing, we have collaborated with reputed organisations such as:

- Indian Academy of Sciences
- Jawaharlal Nehru Centre for Advanced Scientific Research
- Indian National Science Academy
- Indian Space Research Organisation
- Ramanujan Mathematical Society
- Indian Association for Research in Computing Sciences
- American Mathematical Society
- Indian Institute of Metals/Indira Gandhi Centre for Atomic Research

Several of our books have been co-published for the international market by CRC Press and Springer Verlag. In addition to original publishing, we publish books selectively under license from reputed overseas publishers. Some of our overseas associates include:

- CRC Press
- Silicon Press
- American Mathematical Society

Our books are distributed exclusively by **Orient Blackswan Private Limited.**

Invitation to authors

If you have a publishing proposal in your area of specialisation, we will be happy to hear from you. The publication proposal form can be accessed from our website www.universitiespress.com. Alternatively, you may please write to:

The Editorial Department

Universities Press (India) Private Limited
3-6-747/1/A and 3-6-754/1 Himayatnagar
Hyderabad 500 029, Telangana, India
Phone: 91-40-2766 2849/2850/5446/5447, 2761 0898
Fax: 91-40-2764 5046
Email: info@universitiespress.com

CONTENTS

Algebra	1	Mathematical Physics	85
Algebraic Geometry	10	Measure Theory	87
Algebraic Number Theory	14	Mechanics	90
Analysis	16	Number Theory	91
Analytic Number Theory	28	Number Theory and Combinatorics	96
Approximation Theory	31	Number Theory and Geometry	98
Calculus	32	Numerical Analysis	98
Combinatorics	33	Operations Research	101
Complex Analysis	34	Operator Theory	103
Computational Mathematics	38	Optimisation	103
Cryptography	41	Probability	103
Differential Equations	42	Problems for Intermediate and Undergraduate	108
Differential Geometry	48	Quantum Computing	109
Discrete Mathematics	52	Quantum Graphs	111
Dynamical Systems	52	Quantum Mechanics	114
Engineering Mathematics	55	Set Theory	115
Fourier Analysis	46	Statistics	116
Functional Analysis	58	Topology	117
Game Theory	61	Trigonometry	121
General Mathematics	64		
General Mathematics: Little Mathematical Treasures	66	GENERAL INTEREST AND MANAGEMENT	123
General Mathematics: Mathematical Marvels	68	Encyclopaedia	123
General Mathematics: Mathematical Methods	69	Biographies	124
Geometry	70	General Interest	129
Harmonic Analysis	75	Management	135
History of Mathematics	76		
Knot Theory	77	E-Books	143
Linear Algebra	78	Author Index	147
Mathematical Finance	81	Title Index	151
Mathematical Methods	84	Register with Us	155
Mathematical Modelling	84		

ALGEBRA

Abstract Algebra

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		₹ 720.00

Advanced Modern Algebra

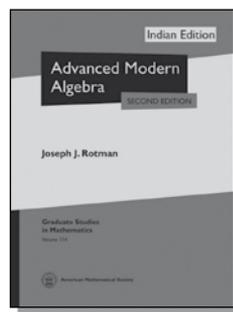
(Second Edition)





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.

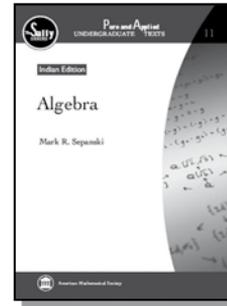
Contents: *Preface to Second Edition* ♦ *Special Notation* ♦ Groups I ♦ Classical Formulas ♦ Permutations ♦ Groups ♦ Lagrange’s Theorem ♦ Homomorphisms ♦ Quotient Groups ♦ Group Actions ♦ Counting ♦ Commutative Rings I ♦ First Properties ♦ Polynomials ♦ Homomorphisms ♦ From Arithmetic to Polynomials ♦ 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 ♦ Luroth’s Theorem ♦ Transcendence ♦ Separability ♦ Varieties ♦ Varieties and Ideals ♦ Nullstellensatz ♦ Irreducible Varieties ♦ Primary Decomposition ♦ Algorithms in $k[x, \dots, x_n]$ ♦ Monomial Orders ♦ Division Algorithm ♦ Gröbner Bases ♦ Buchberger’s Algorithm ♦ Rings ♦ Modules ♦ Categories ♦ Functors ♦ Free and Projective Modules

2014	1024 pp.	Paperback
978-1-4704-1916-5		₹ 2,040.00

Algebra

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		₹ 960.00

Algebra

(Third Edition)

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.

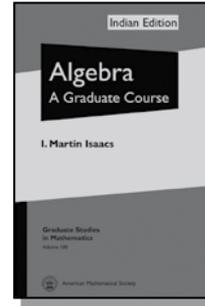
Contents: Sets, functions, and integers ♦ Groups ♦ Rings ♦ Universal constructions ♦ Modules ♦ Vector spaces ♦ Matrices ♦ Special fields ♦ Determinants and tensor products ♦ Bilinear and quadratic forms ♦ Similar matrices and finite abelian groups ♦ Structure of groups ♦ Galois theory ♦ Lattices ♦ Categories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

2013	648 pp.	Paperback
978-1-4704-0933-3		₹ 1,320.00

Algebra: A Graduate Course

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.

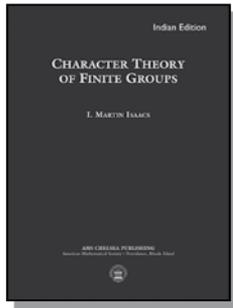
Contents: *Part One:* Non Commutative Algebra ♦ Definitions and Examples of Groups ♦ Subgroups and Cosets ♦ Homomorphisms ♦ Group Actions ♦ The Sylow Theorems and p-groups ♦ Permutation Groups ♦ New Groups from Old ♦ Solvable and Nilpotent Groups ♦ Transfer ♦ Operator Groups and Unique Decompositions ♦ 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 ♦ Galois 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		₹ 1,285.00

Character Theory of Finite Groups

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*

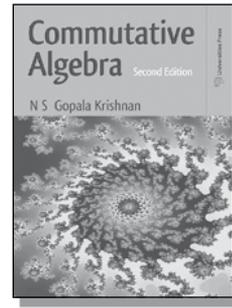
2012 303 pp. Paperback
978-0-8218-8707-3 ₹ 1,020.00

Commutative Algebra NEW

(Second Edition)

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 ₹ 425.00

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 ₹ 1,330.00

Course in Algebra, A *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	511 pp.	Paperback
978-0-8218-4858-6		₹ 1,435.00

Field and Galois Theory*Patrick Morandi*

The purpose of this book is twofold. First, it is written to be a textbook for a graduate level course on Galois theory or field theory. Second, it is designed to be a reference for researchers who need to know field theory. The book is written at the level of students who have familiarity with the basic concepts of group, ring, vector space theory, including the Sylow theorems, factorization in polynomial rings, and theorems about bases of vector spaces. *This book has a large number of*

examples and exercises, a large number of topics covered, and complete proofs given for the stated results.

2010	304 pp.	Paperback
978-81-8489-621-3		₹ 575.00

Finite Fields and Applications *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	175 pp.	Paperback
978-0-8218-8732-5		₹ 900.00

Finite Group Theory



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		₹ 1,075.00

Graduate Algebra: Commutative View



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

www.universitiespress.com

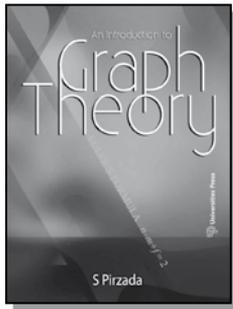
Algebraic Foundations of Geometry ♦ Applications to Algebraic Geometry over the Rationals–Diophantine Equations and Elliptic Curves ♦ Absolute Values and Valuation Rings ♦ *List of major results* ♦ *Bibliography* ♦ *Index*

2010 456 pp. Paperback
978-0-8218-5220-0 ₹ 1,405.00

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 ₹ 425.00

Introduction to Lie Algebras and Representation Theory

James E Humphreys

This book is designed to introduce the reader to the theory of semisimple Lie algebras over an algebraically closed field of characteristic 0, with emphasis on representations. A good knowledge of linear algebra (including Eigenvalues, bilinear forms, Euclidean spaces, and tensor products of vector spaces) is presupposed, as well as some acquaintance with the methods of abstract algebra. *The first four chapters might well be read by a bright undergraduate; however, the remaining three chapters are more demanding.*

2010 192 pp. Paperback
978-81-8489-616-9 ₹ 425.00

Introduction to Representation Theory

NEW

AMS

Pavel Etingof

Massachusetts Institute of Technology, Cambridge, USA

Oleg Golberg

Universität Bonn, Germany

Sebastian Hensel

Universität Bonn, Germany

Tiankai Liu

Massachusetts Institute of Technology, Cambridge, USA

Alex Schwendner

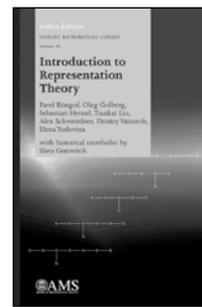
Two Sigma Investments, New York, USA

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		₹ 900.00

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		₹ 795.00

Linear Algebra Done Right (Second Edition)

Sheldon Axler

This text for a second course in linear algebra is aimed at math majors and graduate students. The novel approach taken here banishes determinants to the end of the book and focusses on the central goal of linear algebra: understanding the structure of linear operators on vector spaces. The author has taken unusual care to motivate concepts and to simplify proofs. A variety of interesting exercises in each chapter helps students understand and manipulate the objects of linear algebra. No prerequisites are assumed other than the usual demand for suitable mathematical maturity. *This second edition includes a new section on orthogonal projections and minimization problems. The sections on self-adjoint operators, normal operators, and the spectral theorem have been rewritten. New examples and new exercises have been added, several proofs have been simplified, and hundreds of minor improvements have been made throughout the text.*

2010	266 pp.	Paperback
978-81-8489-532-2		₹ 595.00

Representation Theory and Automorphic Forms

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

www.universitiespress.com

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 ₹ 1,365.00

Representations of Finite and Compact Groups

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 representations (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 266 pp. Paperback
978-0-8218-4851-7 ₹ 930.00

Topics in Abstract Algebra (Second Edition)

M K Sen

Formerly Department of Pure Mathematics, University of Calcutta, Kolkata, India

Shamik Ghosh

Reader, Mathematics Department, Jadavpur University, Kolkata, India

Parthasarathi Mukhopadhyay

Senior Lecturer, R K Mission Residential College, Narendrapur, India

This book is designed in accordance with the new UGC syllabus for all Indian universities at the undergraduate and advanced honours levels as well as for the first year post-graduate students of many Indian universities. Students appearing for the NET, GATE, SLET or MCA examination will find this book useful too. Moreover, the curriculum requirements of Abstract Algebra offered in engineering courses are also covered in this book.

This edition has a complete chapter with worked out examples and exercises on Boolean Algebra. The Chinese remainder theorem and Euler's Phi function has also been discussed in the appendix.

Among the salient features of the book are:

- A rich collection of numerous examples
- Visual illustrations wherever necessary
- Explanatory notes in the form of footnotes
- Some mind-boggling, relevant problems with their latest developments, in the Appendices

- Various references to relevant web sites
- Glimpses of relevant history of mathematics and mathematicians
- Large number of solved exercises
- Well-planned and graded exercises with objective and multiple choice questions
- Answers (with hints) to large number of exercises

Contents: *Preface to the Second Edition* ♦ *Preface to the First Edition* ♦ Preliminaries ♦ Integers ♦ Groups ♦ Permutation Groups ♦ Subgroups ♦ Homomorphisms of Groups ♦ Direct Product of Groups ♦ Symmetry ♦ Sylow Theorems ♦ Simple Groups ♦ Rings ♦ Ideals and Homomorphisms of Rings ♦ Factorization in Integral Domains ♦ Polynomial Rings ♦ Boolean Algebra ♦ *Appendices* ♦ *Bibliography* ♦ *Answers* ♦ *Index*

2004	436 pp.	Paperback
978-81-7371-551-8		₹ 395.00

Topics in Applied Abstract Algebra

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		₹ 1,105.00

Transformation Groups for Beginners

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		₹ 900.00

ALGEBRAIC GEOMETRY

Algebraic and Geometric Theory of Quadratic Forms, The

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*

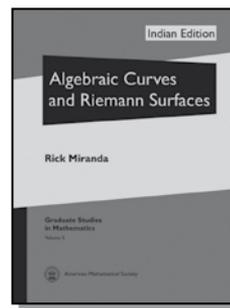
2011	448 pp.	Paperback
978-0-8218-6876-8		₹ 1,285.00

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		₹ 1,365.00

Algebraic Geometry: A Problem-solving Approach




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

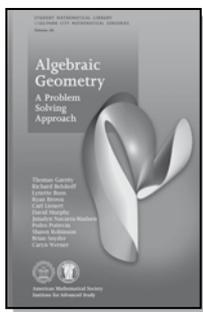
Colorado Mesa University, Grand Junction, USA

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 P^2 ♦ Projective Changes of Coordinates ♦ The Complex Projective Line P^1 ♦ 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 C^2 ♦ 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 ♦ $\text{Spec}(R)$ ♦ 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 ♦ $\text{Proj}(R)$ ♦ Chapter 6. The Next Steps: Sheaves and Cohomology ♦ Intuition and Motivation for Sheaves ♦ The Definition of a

www.universitiespress.com

Sheaf ♦ The Sheaf of Rational Functions ♦ Divisors
♦ Invertible Sheaves and Divisors ♦ Basic Homology
Theory ♦ Čech Cohomology ♦ *Bibliography* ♦ *Index*

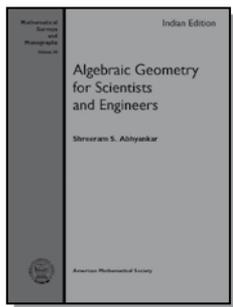
2013 340 pp. Paperback
978-1-4704-2597-5 ₹ 1,020.00

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 ₹ 1,075.00

Algebraic Geometry: A First Course

Joe Harris

This book is intended to introduce students to algebraic geometry; to give them a sense of the basic objects considered, the questions asked about them, and the sort of answers one can expect to obtain. It thus emphasises the classical roots of the subject. For readers interested in simply seeing what the subject is about, this avoids the more technical details better treated with the most recent methods. For readers interested in pursuing the subject further, this book will provide a basis for understanding the developments of the last half century, which have put the subject on a radically new footing. Based on lectures given at Brown and Harvard Universities, this book retains the informal style of the lectures and stresses examples throughout; the theory is developed as needed. The first part is concerned with introducing basic varieties and constructions; it describes, for example, affine and projective varieties, regular and rational maps, and particular classes of varieties such as determinantal varieties and algebraic groups. The second part discusses attributes of varieties, including dimension, smoothness, tangent spaces and cones, degree and parameter and moduli spaces.

2010 347 pp. Paperback
978-81-8489-522-3 ₹ 695.00

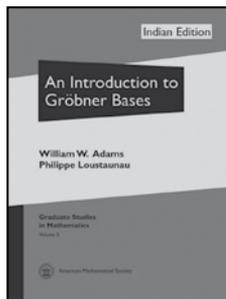
Introduction to Gröbner Bases, An

William W Adams

University of Maryland, College Park, USA

Philippe Loustau

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 Loustau 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

289 pp.

Paperback

978-0-8218-8715-8

₹ 1,020.00

ALGEBRAIC NUMBER THEORY

Algebraic Number Fields (Second Edition)

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

www.universitiespress.com

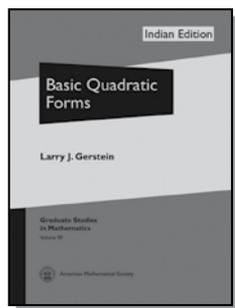
methods and Ray classes ♦ Class field theory ♦ Quadratic fields ♦ *Appendix* ♦ *References* ♦ *Index*

2010 288 pp. Paperback
978-0-8218-5219-4 ₹ 955.00

Basic Quadratic Forms

Larry J Gerstein

University of California, Santa Barbara, USA



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 p-adic numbers ♦ Quadratic spaces over \mathbb{Q}_p ♦ Quadratic spaces over \mathbb{Q} ♦ Lattices over principal ideal domains ♦ Initial integral results ♦ Local classification of lattices ♦ The local-global approach to lattices ♦

Lattices over F_q ♦ Applications to cryptography ♦ *Further reading* ♦ *Bibliography* ♦ *Index*

2012 255 pp. Paperback
978-0-8218-8720-2 ₹ 960.00

Class Field Theory

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 192 pp. Paperback
978-0-8218-8709-7 ₹ 900.00

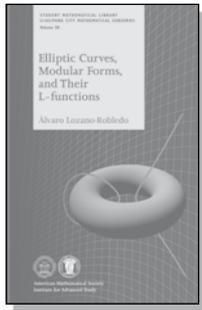
Elliptic Curves, Modular Forms and Other L-Functions

NEW

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 $E(\mathbb{Q})$ ♦ The torsion subgroup ♦ Elliptic curves over finite fields ♦ The rank and the free part of $E(\mathbb{Q})$ ♦ 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 \mathbb{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*

2011

204 pp.

Paperback

978-1-4704-2593-7

₹ 840.00

ANALYSIS

Advanced Calculus

AMS

(Second Edition)

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.*

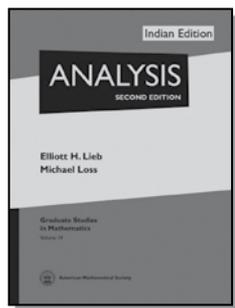
Contents: Tools for Analysis ♦ Convergent Sequences ♦ Continuous Functions ♦ Differentiation ♦ Elementary Functions as solutions of Differential Equations ♦ Integration: Two Fundamental Theorems ♦ Integration: Further Topics ♦ Approximation by Taylor Polynomials ♦ Sequences and Series of Functions ♦ 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		₹ 1,515.00

Analysis 
(Second Edition)

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		₹ 1,080.00

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

₹ 1,705.00

Course in Abstract Analysis, A

NEW

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. It 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 ♦ L_p -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 $C_0(X)$ ♦ Functions of bounded variation ♦ Linear functionals on L_p -spaces ♦ Product measures 4.8. Lebesgue measure on \mathbb{R}^d ♦ Differentiation on \mathbb{R}^d ♦ 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*

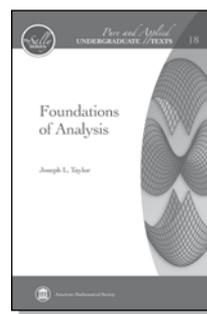
2012	384 pp.	Paperback
978-1-4704-2587-6		₹ 1,080.00

Foundations of Analysis

NEW 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 ♦ \liminf and \limsup ♦ 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*

2012
978-1-4704-2579-1

408 pp.

Paperback
₹ 1,140.00

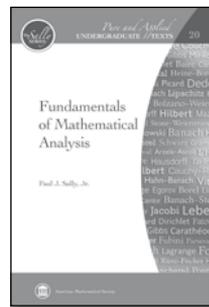
Fundamentals of Mathematical Analysis

NEW

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 \mathbb{R} ♦ Automorphisms of Fields ♦ Complex Numbers ♦ Convergence in \mathbb{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 \mathbb{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 \mathbb{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 $\infty(F)$ ♦ 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 \mathbb{R}^n ♦ 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 \mathbb{R}^n ♦ Max-Min Problems ♦ Lagrange Multipliers ♦ The Implicit and Inverse Function Theorems ♦ Independent Projects ♦ Chapter 6. Integration ♦ Measures ♦ Lebesgue Measure ♦ Measurable Functions ♦ The Integral ♦ L_p 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 $(\mathbb{R}, +)$ ♦ Fourier Inversion on $(\mathbb{R}, +)$ ♦ 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 \mathbb{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

2013	376 pp.	Paperback
978-1-4704-2581-4		₹ 1,080.00

Introduction to Analysis



(Fifth Edition)

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		₹ 835.00

Introduction to Analysis, An

Arlen Brown & Carl Percy

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

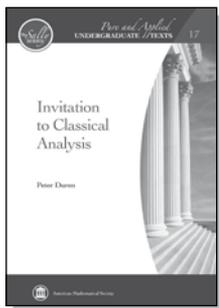
₹ 625.00

Invitation to Classical Analysis




Peter Duren

University of Michigan, Ann Arbor, USA



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*

2012 408 pp. Paperback
978-1-4704-2578-4 ₹ 1,140.00

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 ₹ 295.00

Mathematical Analysis: An Introduction

Andrew Browder

This is a textbook containing more than enough material for a year-long course in analysis at the advanced undergraduate or beginning graduate level. The book begins with a brief discussion of sets and mappings, describes the real number field, and proceeds to a treatment of real-valued functions of a real variable. Separate chapters are devoted to the ideas of convergent sequences

and series, continuous functions, differentiation, and the Riemann integral.

2010 447 pp. Paperback
978-81-8489-520-9 ₹ 625.00

p-adic Analysis Compared with Real

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 \mathbb{Q}_p vs. the Topology of \mathbb{R} ◆ Elementary Analysis in \mathbb{Q}_p ◆ p-adic Functions ◆ Answers, Hints, and Solutions for Selected Exercises ◆ *Bibliography* ◆ *Index*

2010 168 pp. Paperback
978-0-8218-5224-8 ₹ 655.00

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

W J Kaczor

Marie Curie-Sklodowska University, Lublin, Poland

M T Nowak

Marie Curie-Skłodowska University, Lublin, Poland

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 978-0-8218-4854-8	380 pp.	Paperback ₹ 1,110.00
---------------------------	---------	-------------------------

Problems in Mathematical Analysis II: Continuity and Differentiation

W J Kaczor

Marie Curie-Skłodowska University, Lublin, Poland

M T Nowak

Marie Curie-Skłodowska 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 978-0-8218-4855-5	416 pp.	Paperback ₹ 1,110.00
---------------------------	---------	-------------------------

Problems in Mathematical Analysis III: Integration

W J Kaczor

Marie Curie-Skłodowska University, Lublin, Poland

M T Nowak

Marie Curie-Skłodowska 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 unequalled. 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 ₹ 1,050.00

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 ₹ 850.00

Real Analysis

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 \mathbb{R}^n . 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 $\sum a_n$ ♦ 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

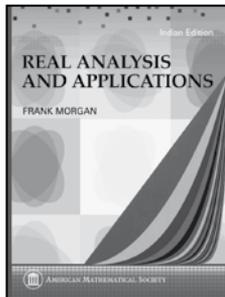
2010 160 pp. Paperback
978-0-8218-5222-4 ₹ 780.00

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 of variations, 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, logical proofs, 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

200 pp.

Paperback

978-0-8218-9185-8

₹ 900.00

Semiclassical Analysis

NEW

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 \mathbb{R}^{2n} ♦ 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 L^2 ♦ 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 ♦ L^p 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 ♦ Schrödinger 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. Poincaré'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

2012 448 pp. Paperback
978-1-4704-2584-5 ₹ 1,140.00

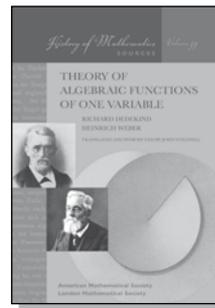
Theory of Algebraic Functions of One Variable

NEW

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 \mathfrak{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 \mathfrak{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*

2012	160 pp.	Paperback
978-1-4704-2590-6		₹ 780.00

Undergraduate Analysis (Second Edition)

Serge Lang

This is a logically self-contained introduction to analysis, suitable for students who have had two years of calculus. The book centers on those properties that have to do with uniform convergence and uniform limits in the context of differentiation and integration. Topics discussed include the classical test for convergence of series, Fourier series, polynomial approximation, the Poisson kernel, the construction of harmonic functions on the disc, ordinary differential equation, curve

integrals, derivatives in vector spaces, multiple integrals, and others. *One of the author's main concerns is to achieve a balance between concrete examples and general theorems, augmented by a variety of interesting exercises.*

Some new material has been added in this second edition, for example: a new chapter on the global version of integration of locally integrable vector fields; a brief discussion of L1-Cauchy sequences, introducing students to the Lebesgue integral; more material on Dirac sequences and families, including a section on the heat kernel; a more systematic discussion of orders of magnitude; and a number of new exercises.

Contents: Sets and Mappings ♦ Real Numbers ♦ Limits and Continuous Functions ♦ Differentiation ♦ Elementary Functions ♦ The Elementary Real Integral ♦ Normed Vector Spaces ♦ Limits ♦ Compactness ♦ Series ♦ The Integral in One Variable ♦ Appendix: The Lebesgue Integral ♦ Approximation with Convolutions ♦ Fourier Series ♦ Improper Integrals ♦ The Fourier Integral ♦ Calculus in Vector Spaces ♦ The Winding Number and Global Potential Functions Derivatives in Vector Spaces ♦ Inverse Mapping Theorem ♦ Ordinary Differential Equations ♦ Multiple Integration ♦ Differential Forms ♦ *Appendix*

2010	688 pp.	Paperback
978-81-8489-628-2		₹ 975.00

ANALYTIC NUMBER THEORY

Analytic Number Theory

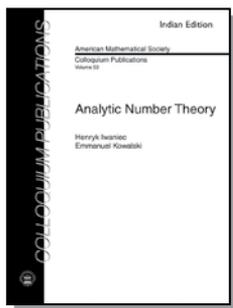


Henryk Iwaniec

Rutgers University, Piscataway, USA

Emmanuel Kowalski

Université Bordeaux I, Talence, France



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

615 pp.

Paperback

978-0-8218-8710-3

₹ 1,320.00

Analytic Number Theory

NEW

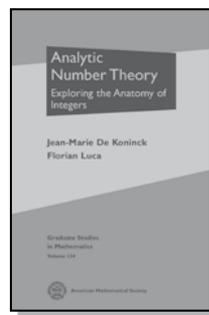
AMS

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 Erdős-Wintner theorem

Problems on Chapter 6

- ◊ Chapter 7. The Local Behavior of Arithmetic Functions
- ◊ The normal order of an arithmetic function
- ◊ The Turán-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 2
- ◊ 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

www.universitiespress.com

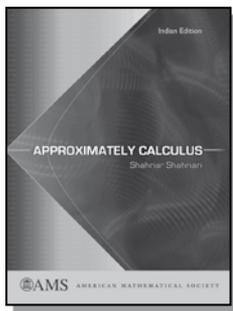
from Chapter 9 ♦ Solutions to problems from Chapter 10 ♦ Solutions to problems from Chapter 11 ♦ Solutions to problems from Chapter 12 ♦ Solutions to problems from Chapter 13 ♦ Solutions to problems from Chapter 14 ♦ Solutions to problems from Chapter 15 ♦ Solutions to problems from Chapter 16 ♦ *Bibliography* ♦ *Index*

2012 432 pp. Paperback
978-1-4704-2583-8 ₹ 1,140.00

Approximately Calculus

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 292 pp. Paperback
978-0-8218-8704-2 ₹ 1,020.00

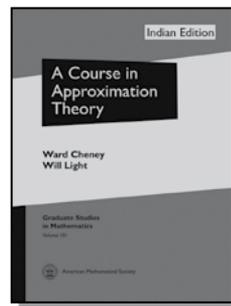
APPROXIMATION THEORY

Course in Approximation Theory, A

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	359 pp.	Paperback
978-0-8218-8711-0		₹ 1,080.00

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		₹ 475.00

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		₹ 250.00

www.universitiespress.com

Partial Differential Equations

Jeffrey Rauch

Series: Low Priced Edition of Springer Mathematics Titles

The objective of this book is to present an introduction to the ideas, phenomena, and methods of partial differential equations. This material can be presented in one semester and requires no previous knowledge of differential equations, but assumes the reader to be familiar with advanced calculus, real analysis, the rudiments of complex analysis, and the language of functional analysis. Topics discussed in the text include elliptic, hyperbolic, and parabolic equations, the energy method, maximum principle, and the Fourier Transform. The text features many historical and scientific motivations and applications. Included throughout are exercises, hints, and discussions which form an important and integral part of the course.

Contents: Power Series Methods ♦ Some Harmonic Analysis ♦ Solution of Initial Value Problems by Fourier Synthesis ♦ Propagators and x-Space Methods ♦ The Dirichlet Problem *Appendix: A Crash Course in Distribution* ♦ Theory ♦ References ♦ Index

2010	280 pp.	Paperback
978-81-8489-623-7		₹ 495.00

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=mc²

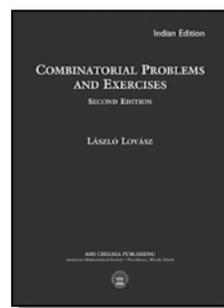
2010	416 pp.	Paperback
978-81-8489-622-0		₹ 750.00

COMBINATORICS

Combinatorial Problems and Exercises (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	639 pp.	Paperback
978-0-8218-8708-0		₹ 1,320.00

COMPLEX ANALYSIS

Complex Made Simple

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 $\text{Aut}(D)$ ♦ 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	489 pp.	Paperback
978-0-8218-8722-6		₹ 1,200.00

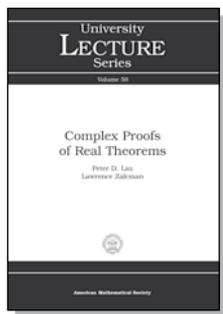
Complex Proofs of Real Theorems

Peter D Lax

Courant Institute, New York, USA

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-Zelazko 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

2012

104 pp.

Paperback

978-1-4704-2600-2

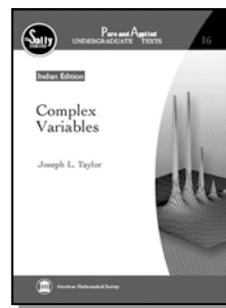
₹ 780.00

Complex Variables



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		₹ 1,020.00

Function Theory of One Complex Variable

(Third Edition)

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.

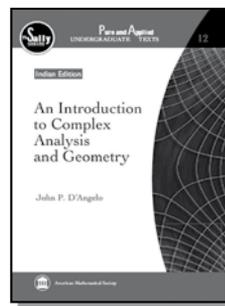
Contents: Fundamental Concepts ♦ Complex Line Integrals ♦ Applications of the Cauchy Integral ♦ Meromorphic Functions and Residues ♦ The Zeros of a Holomorphic Function ♦ Holomorphic Functions as Geometric Mappings ♦ Harmonic Functions ♦ Infinite Series and Products ♦ Applications of Infinite Sums and 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		₹ 1,320.00

Introduction to Complex Analysis and Geometry, An

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

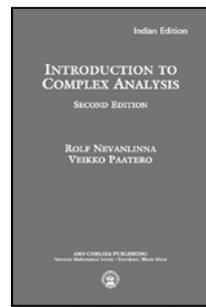
978-1-4704-0912-8

₹ 900.00

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 $\arcsin z$ & $\arccos z$ ♦ 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 $\cot t/z$ ♦ 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 σ -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 as rational 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 Γ -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 352 pp. Paperback
 978-0-8218-9179-7 ₹ 1,080.00

COMPUTATIONAL MATHEMATICS

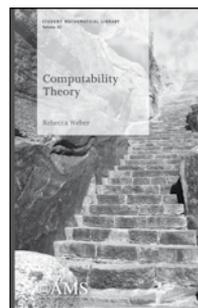
Computability Theory

NEW

AMS

Rebecca Weber

Dartmouth College, Hanover, USA



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,

www.universitiespress.com

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*

2012	208 pp.	Paperback
978-1-4704-2594-4		₹ 900.00

Computer Arithmetic Algorithms (Second Edition)

Israel Koren

Professor of Electrical and Computer Engineering,
University of Massachusetts, Amherst, USA

Explains the principles of algorithms used in arithmetic operations on digital computers: Basic arithmetic operations like addition, subtraction, multiplication, and division in fixed-point and floating-point number systems.

More complex operations such as square root extraction and evaluation of exponential, logarithmic, and trigonometric functions.

New sections on floating-point adders, floating-point exceptions, general carry-look-ahead adders, prefix adders, Ling adders, and fused multiply-add units.

New algorithms and implementations have been added to almost all chapters. An on-line JavaScript-based simulator for many of the algorithms contained in the book is available at www.ecs.umass.edu/ece/koren/arith/simulator.

Contents: *Forward to the Second Edition* ♦ *Preface* ♦ Conventional Number Systems ♦ Unconventional Fixed-Radix Number Systems ♦ Sequential Algorithms for Multiplication and Division ♦ Binary Floating-Point Numbers ♦ Fast Addition ♦ High-Speed Multiplication ♦ Fast Division ♦ Division through Multiplication ♦ Evaluation of Elementary Function ♦ Logarithmic Number System ♦ The Residue Number System ♦ *Index*

2005	300 pp.	Paperback
978-81-7371-533-4		₹ 550.00

Geometric Approximation Algorithms

NEW

AMS

Sariel Har-Peled

University of Illinois at Urbana-Champaign, IL, USA



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. Quadrees – Hierarchical Grids ♦ Quadrees – a simple point-location data-structure ♦ Compressed quadrees ♦ Dynamic quadrees ♦ 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 ϵ -Nets and ϵ -Samples ♦ VC dimension ♦ Shattering dimension and the dual shattering dimension ♦ On ϵ -nets and ϵ -sampling ♦ Discrepancy ♦ Proof of the ϵ -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 quadrees ♦ 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

www.universitiespress.com

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		₹ 1,080.00

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		₹ 650.00

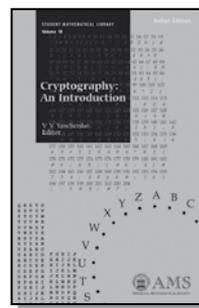
CRYPTOGRAPHY

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 ♦ Cryptography and complexity theory ♦ Cryptographic protocols ♦ Algorithmic problems of number theory ♦ Mathematics of secret sharing ♦ Cryptography olympiads for high school students ♦ *Bibliography*

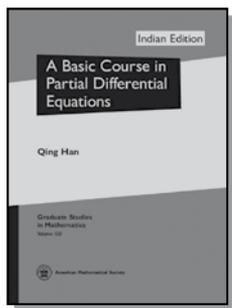
2009 240 pp. Paperback
978-0-8218-4850-0 ₹ 870.00

DIFFERENTIAL EQUATIONS

Basic Course in Partial Differential Equations, A

Qing Han

University of Notre Dame, USA



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 ₹ 1,020.00

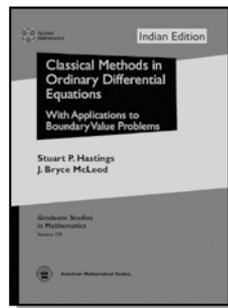
Classical Methods in Ordinary Differential Equations: With Applications to Boundary Value Problems

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 $(-\infty, \infty)$ and two-parameter shooting ♦ Ważewski's principle, Conley index, and an n -dimensional lemma ♦ Some boundary value problems for the Painlevé 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 978-1-4704-0924-1	392 pp.	Paperback ₹ 1,080.00
---------------------------	---------	-------------------------

Differential Equations, Mechanics, and Computation

Richard S Palais

University of California, Irvine, USA

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 978-0-8218-8735-6	313 pp.	Paperback ₹ 1,020.00
---------------------------	---------	-------------------------

Geometry of Differential Forms

AMS

Shigeyuli Morita

University of Tokyo, Japan

Since the times of Gauss, Riemann, and Poincaré, 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

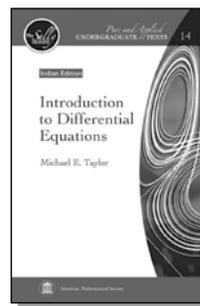
₹ 1,050.00

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.

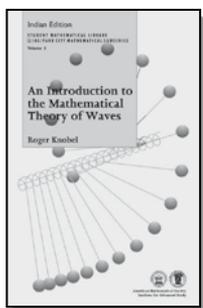
Contents: Preface ♦ Single Differential Equations ♦ Linear Algebra ♦ Linear Systems of Differential Equations ♦ Nonlinear Systems of Differential Equations ♦ Bibliography ♦ Index

2013	424 pp.	Paperback
978-1-4704-0913-5		₹ 1,140.00

Introduction to the Mathematical Theory of Waves, An

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	196 pp.	Paperback
978-0-8218-8729-5		₹ 900.00

Introductory Course in Differential Equations

Daniel A Murray

This book provides a brief exposition of some of the devices employed in solving differential equations. Students of physics and engineering will find the clear and concise treatment of the subject, the detailed worked-out examples and the practical applications ideally suited to their need. For students of science, notes in the latter part of the book provide demonstrations of theorems which are referred to, or partially proved, in the first part.

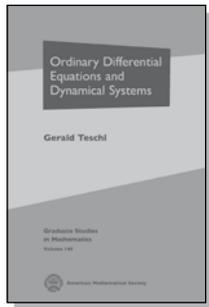
2012	256 pp.	Paperback
978-81-7371-781-9		₹ 225.00

Ordinary Differential Equations and Dynamical Systems




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 Poincaré 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 Poincaré–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 Poincaré 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*

2012

368 pp.

Paperback

978-1-4704-2586-9

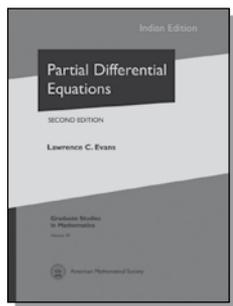
₹ 1,080.00

Partial Differential Equations (Second Edition)



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		₹ 1,435.00

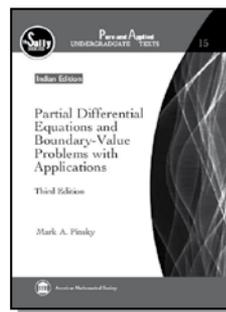
Partial Differential Equations and Boundary-Value Problems with Applications

(Third Edition)



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*

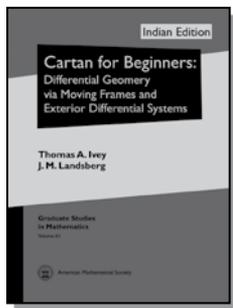
2013 544 pp. Paperback
978-1-4704-0914-2 ₹ 1,200.00

DIFFERENTIAL GEOMETRY

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

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 378 pp. Paperback
978-0-8218-8717-2 ₹ 1,080.00

Curves and Surfaces (Second Edition)

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

www.universitiespress.com

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 \mathbb{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		₹ 1,020.00

Differential Geometry, Lie Groups, and Symmetric Spaces

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 \mathbb{C} and Cartan’s classification of simple Lie algebras over \mathbb{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		₹ 1,735.00

Geometric Analysis on Symmetric Spaces

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 X_0 ♦ Differential Equations on Symmetric Spaces ♦ Eigenspace Representations

♦ *Solutions to Exercises* ♦ *Bibliography* ♦ *Symbols Frequently Used* ♦ *Index*

2011 656 pp. Paperback
978-0-8218-6895-9 ₹ 1,435.00

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 ₹ 990.00

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.

Contents: *Preface ♦ Acknowledgments ♦ A Detailed Guide for the Reader ♦ Notation and Symbols ♦ Riemannian Geometry ♦ Fundamentals of the Ricci Flow Equation ♦ Closed 3-manifolds with Positive Ricci Curvature ♦ Ricci Solitons and Special Solutions ♦ Isoperimetric Estimates and No Local Collapsing ♦ Preparation for Singularity Analysis ♦ High-dimensional and Noncompact Ricci Flow ♦ Singularity Analysis ♦ Ancient Solutions ♦ Differential Harnack Estimates ♦ Space-time Geometry ♦ Appendix A. Geometric Analysis Related to Ricci Flow ♦ Appendix B. Analytic Techniques for Geometric Flows ♦ Appendix S. Solutions to Selected Exercises ♦ Bibliography ♦ Index*

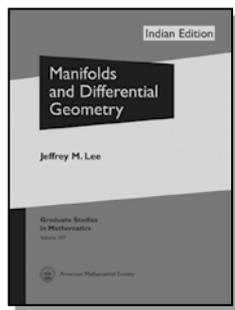
2010 646 pp. Paperback
978-0-8218-5221-7 ₹ 1,735.00

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*

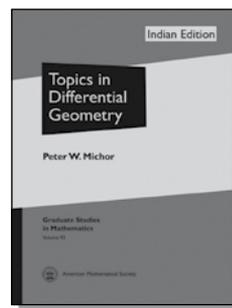
2012	671 pp.	Paperback
978-0-8218-8713-4		₹ 1,320.00

Topics in Differential Geometry



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	494 pp.	Paperback
978-0-8218-8721-9		₹ 1,200.00

DISCRETE MATHEMATICS

Discrete Mathematical Structures with Applications to Combinatorics

V Ramaswamy

Professor and Head, Department of Computer Science and Engineering, SASTRA University, Srinivasa Ramanujan Centre, Kumbakonam, India

Meant to serve as an introduction to discrete mathematical structures, this book covers the topics taught in a one-semester course at the undergraduate level. *Students of BE computer science, information science and other engineering*

branches as well as students of MCA programme will find the book useful. The few chapters included on combinatorics will bring home the practical utility of the various concepts introduced in the book and enable appreciation of the myriad applications that apparently simple concepts such as relations, functions and the pigeon-hole principle have.

Contents: *Preface* ♦ Elements of Mathematical Logic ♦ Fundamentals of Set Theory ♦ Principles of Mathematical Induction ♦ Permutations and Combinations ♦ Recurrence Relations ♦ Relations ♦ Functions ♦ Lattices and Finite Boolean Algebra ♦ Elements of Graph Theory ♦ Algebraic Structures ♦ More on Algebraic Structure ♦ More on Recurrence Relations ♦ More on Functions ♦ Partitions ♦ *Miscellaneous Applications* ♦ *Index*

2006	264 pp.	Paperback
978-81-7371-500-6		₹ 295.00

DYNAMICAL SYSTEMS

Dynamical Systems and Population Persistence

NEW

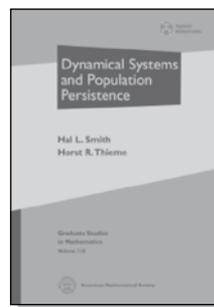
AMS

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 \mathbb{R}^+ ♦ Persistence à la Baron von Münchhausen ♦ 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 C_0 -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 $Lp(\mathbb{R}^+)$ ♦ B.2. Volterra integral equations ♦ B.3.

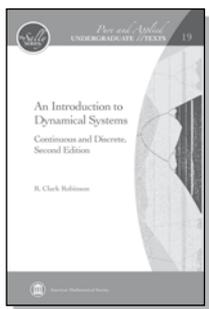
Fourier transform methods for integro-differential equations ♦ *B.4. Closed linear operators* ♦ *B.5. Exercises* ♦ *Bibliography* ♦ *Index*

2011 424 pp. Paperback
978-1-4704-2561-6 ₹ 1,140.00

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

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 ♦ Poincaré–Bendixson Theorem ♦ Self-Excited Oscillator ♦ Andronov–Hopf ♦ Homoclinic Bifurcation ♦ Rate of Change of Volume ♦ Poincaré 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*

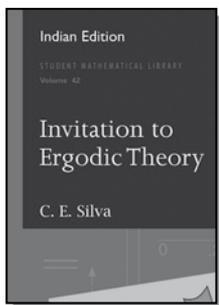
2012 756 pp. Paperback
 978-1-4704-2580-7 ₹ 1,440.00

Invitation to Ergodic Theory



C E Silva

Williams College, Williamstown, USA



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 L_p 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 \mathbb{R}* ♦ *Appendix B: Topology of \mathbb{R} and metric spaces* ♦ *Bibliographical notes* ♦ *Bibliography* ♦ *Index*

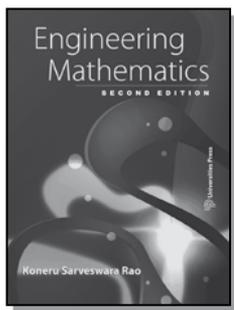
2012 262 pp. Paperback
 978-0-8218-8733-2 ₹ 960.00

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		₹ 495.00

FOURIER ANALYSIS

Fourier Analysis

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, H_1 , BMO spaces, and the T_1 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 H_1 , 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 T_1 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

www.universitiespress.com

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.

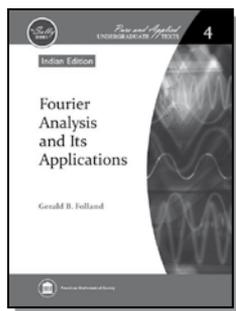
Contents: Fourier series and integrals ♦ The Hardy-Littlewood maximal function ♦ The Hilbert transform ♦ Singular integrals (I) ♦ Singular integrals (II) ♦ H1 and BMO ♦ Weighted inequalities ♦ Littlewood-Paley theory and multipliers ♦ The T1 theorem ♦ *Bibliography ♦ Index*

2013 240 pp. Paperback
978-1-4704-0926-5 ₹ 900.00

Fourier Analysis and Its Applications

Gerald B Folland

University of Washington, Seattle, USA



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*

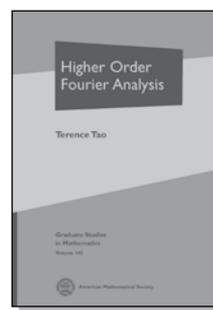
2010 433 pp. Paperback
978-0-8218-5208-8 ₹ 1,395.00

Higher Order Fourier Analysis

Terence Tao

University of California, Los Angeles, USA



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.

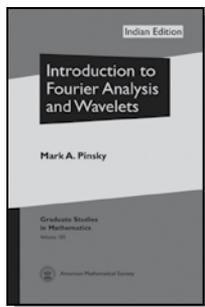
Contents: Preface ♦ Acknowledgments ♦ Chapter 1. Higher order Fourier analysis ♦ Equidistribution of polynomial sequences in tori ♦ Roth's theorem ♦ Linear patterns ♦ Equidistribution of polynomials over finite fields ♦ The inverse conjecture for the Gowers norm I. The finite field case ♦ The inverse 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

2012 200 pp. Paperback
978-1-4704-2588-3 ₹ 900.00

Introduction to Fourier Analysis and Wavelets

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 $L^p(\mathbb{R}^n)$. 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 L_p spaces ♦ Poisson summation formula and multiple Fourier series ♦ Applications to probability theory ♦ Introduction to wavelets ♦ References ♦ Notations ♦ Index

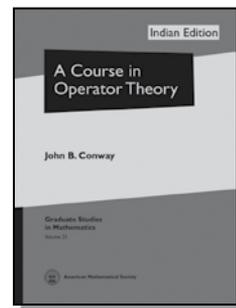
2012 376 pp. Paperback
978-0-8218-8712-7 ₹ 1,080.00

FUNCTIONAL ANALYSIS

Course in Operator Theory, A

John B Conway

University of Tennessee, Knoxville, USA



www.universitiespress.com

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		₹ 1,080.00

Functional Analysis: An Introduction

AMS

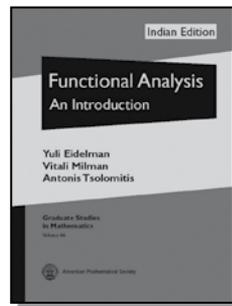
Yuli Eidelman
Tel Aviv University, Israel

Vitali Milman

Tel Aviv University, Israel

Antonis Tzolomitis

University of the Aegean, Samos, Greece



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*

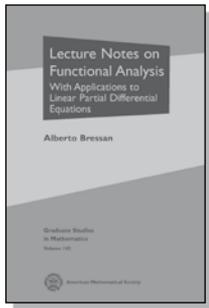
2011	344 pp.	Paperback
978-0-8218-6879-9		₹ 1,075.00

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




Alberto Bressan

Pennsylvania State University, University Park, USA



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*

2013

264 pp.

Paperback

978-1-4704-2589-0

₹ 960.00

Principles of Functional Analysis (Second Edition)



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*

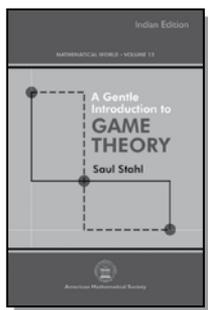
2009 425 pp. Paperback
978-0-8218-4856-2 ₹ 1,080.00

GAME THEORY

Gentle Introduction to Game Theory, A

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.

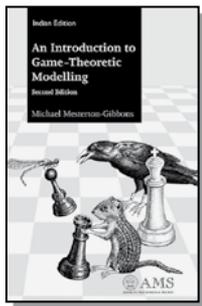
Contents: Introduction ♦ The formal definitions ♦ Optimal responses to specific strategies ♦ The maximin strategy ♦ The minimax strategy ♦ Solutions of zero-sum games ♦ $2 \times n$ and $m \times 2$ games ♦ Dominance ♦ Symmetric games ♦ Poker-like games ♦ Pure maximin and minimax strategies ♦ Pure nonzero-sum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

2012 176 pp. Paperback
978-0-8218-9182-7 ₹ 900.00

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

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	368 pp.	Paperback
978-0-8218-9186-5		₹ 1,080.00

Introductory Course on Mathematical Game Theory, An

Julio González-Díaz

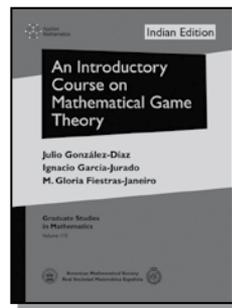
Universidade de Santiago de Compostela, Spain

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.

Contents: Preface ♦ Introduction to Decision Theory ♦ Preliminaries ♦ Ordinal Utility ♦ Linear Utility ♦ Strategic Games ♦ Introduction to Strategic Games ♦ Nash Equilibrium in Strategic Games ♦ Two-Player Zero-Sum Games ♦ Mixed Strategies in Finite Games ♦ Bimatrix Games ♦ Matrix Games ♦ Algorithms for Matrix Games ♦ Matrix Games and Linear Programming ♦ Refinements of Nash Equilibrium in Finite Games ♦ A Basic Model of Knowledge ♦ Correlated Equilibrium ♦ On the Epistemic Foundations of the Different Solution ♦ Concepts for Strategic Games ♦ Fixed-Point Theorems ♦ On Extreme Points and Convex Sets: Krein-Milman Theorem ♦ Exercises ♦ Extensive Games ♦ Introduction to Extensive Games ♦ Strategies in Extensive Games: Mixed Strategies vs. Behavior Strategies ♦ Nash Equilibrium in Extensive Games ♦ Subgame Perfect Equilibrium ♦ Sequential Equilibrium ♦ Further Refinements ♦ Repeated Games ♦ Exercises ♦ Games with Incomplete Information ♦ Incomplete Information: Introduction and Modeling ♦ Bayesian Games and Bayesian Nash Equilibrium ♦ The Chain Store Paradox in Perspective ♦ A First Application of Bayesian Games: Auctions ♦ A Second Application of Bayesian Games: Mechanism Design and the Revelation Principle ♦ Extensive Games with Incomplete Information: Multistage Games and Perfect Bayesian Equilibrium ♦ An Outline of Harsanyi's Approach ♦ Exercises ♦ Cooperative Games ♦ Introduction to Cooperative Games ♦ Nontransferable Utility Games ♦ Bargaining ♦ Transferable Utility Games ♦ The Core and Related Concepts ♦ The Shapley Value ♦ The Nucleolus ♦ Convex Games ♦ Noncooperative Models in Cooperative Game Theory: Implementation Theory ♦ Airport Problems and Airport Games ♦ Bankruptcy Problems and Bankruptcy Games ♦ Voting Problems and Voting Games: Power Indices ♦ Cooperation

in Operations Research Models ♦ Exercises ♦ Bibliography ♦ Notations ♦ Index of Authors

2012 324 pp. Paperback
978-0-8218-9180-3 ₹ 1,020.00

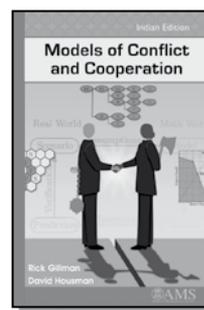
Models of Conflict and Co-operation

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 420 pp. Paperback
 978-0-8218-9183-4 ₹ 1,140.00

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 270 pp. Paperback
 978-81-8489-526-1 ₹ 595.00

GENERAL MATHEMATICS

Fun and Fundamentals of Mathematics

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 ₹ 375.00

IMO Compendium, The: A Collection of Problems Suggested for The International Mathematical Olympiads: 1959–2004

Dusan Djukic´, Vladimir Jankovic´, Ivan Matic´ & Nikola Petrovic´

The IMO has sparked off a burst of creativity among enthusiasts in creating new and interesting mathematics problems. In an extremely stiff competition, only six problems are chosen each year to appear on the IMO. The total number of problems proposed for the IMOs up to this point is staggering and, as a whole, this collection of problems represents a valuable resource for all high school students preparing for the IMO.

The IMO Compendium is the ultimate collection of challenging high-school level mathematics problems. It will be an invaluable resource, not only for high-school students preparing for mathematics competitions, but for anyone who loves and appreciates math.

2010 760 pp. Paperback
 978-81-8489-525-4 ₹ 995.00

Math Charmers: Tantalizing Tidbits for the Mind

Alfred S Posamentier

Dean, School of Education; Professor of Mathematics, City College, City University of New York, USA

This book aims to inspire people by the beauty of mathematics and not necessarily its usefulness, as is most often the case when trying to motivate youngsters to the subject. *It provides sufficient evidence of the beauty of mathematics through many examples in a variety of its branches. To make these examples attractive and effective, they were selected on the basis of the ease with which they can be understood at first reading.*

2006 302 pp. Paperback
 978-81-7371-562-4 ₹ 525.00

Math Explorer, The: A Journey through the Beauty of Mathematics

Jefferson Hane Weaver

Attorney and popular science author, USA

This stress-free layperson’s introduction to the intriguing world of numbers is *designed to acquaint the general reader with the elegance and wonder of mathematics*. Even the most math-phobic among us will be lulled into appreciation by *Weaver’s* creative and disarming discussions of this supposedly formidable intellectual discipline.

www.universitiespress.com

He covers all the basics: irrational and imaginary numbers, algebra, geometry, trigonometry, differential and integral calculus, the concepts of zero and infinity, vectors, set theory, chance and probability, and much more. This enjoyable volume gives readers a working knowledge of math's most important concepts, an appreciation of its elegant logical structure, and an understanding of its historical significance in creating our contemporary world.

2006	288 pp.	Paperback
978-81-7371-563-1		₹ 525.00

Mathematical Omnibus: Thirty Lectures on Classic Mathematics

Dmitry Fuchs

University of California, Davis, USA

Serge Tabachnikov

Pennsylvania State University, University Park, USA

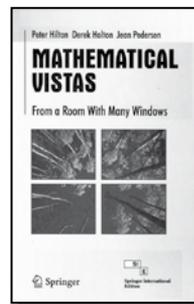
The book consists of thirty lectures on diverse topics, covering much of the mathematical landscape rather than focusing on one area. The reader will learn numerous results that often belong to neither the standard undergraduate nor graduate curriculum and will discover connections between classical 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		₹ 1,285.00

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	349 pp.	Paperback
978-81-8489-523-0		₹ 695.00

Popular Lectures in Undergraduate Mathematics

Sadashiv G Deo

Formerly Professor of Mathematics; Dean of Faculty of Sciences, Goa University, Bambolim, India

Damodar Y Kasture

Formerly Professor and Head, Department of Mathematics, Dr B A Marathwada University, Aurangabad, India

H V Kumbhojkar

Formerly Professor and Head, Department of Mathematics, Shivaji University, Kolhapur, India

Vasant G Tikekar

Formerly Professor and Chairman, Department of Mathematics, Indian Institute of Science, Bengaluru, India

“What is mathematics?”, “What does it have to do with real life?”—These are questions which are rarely answered while teaching mathematics. But once students realise the meaning of mathematics, its strengths and limitations, its history and future, its relations with real-life situations, its beauty and intellectual challenges, the learning process becomes a fountain of delight and pleasure. The aim of this book is to provide just such an approach to teaching and learning. The present volume is the outcome of a series of lectures delivered at many universities, colleges, seminars and conferences to reduce the gap between classroom teaching and learning. *The lectures will help mathematics teachers make their classroom discussions more innovative, promising and fruitful. The book also provides scope for students and teachers to formulate interesting mathematical projects for their curriculum requirements.*

2009	284 pp.	Paperback
978-81-7371-662-1		₹ 550.00

Proofs from THE BOOK, 4th edn

Martin Aigner & Günter M Ziegler

This revised and enlarged fourth edition of Proofs from THE BOOK features five new chapters, which treat classical results such as the fundamental theorem of algebra, problems about tilings, but also quite recent proofs, for example of the Kneser conjecture in graph theory. The new edition also presents further improvements and surprises, among them, a new proof for Hilbert’s third problem.

2010	282 pp.	Paperback
978-81-8489-533-9		₹ 450.00

Theorems and Counterexamples in Mathematics

Bernard R Gelbaum & John M H Olmsted

This text is intended to provide graduate and advanced undergraduate students as well as the general mathematical public with a modern treatment of various theorems and examples in mathematics. A carefully arranged mixture of theorems, examples, exercises, hints and

discussions sharpens and highlights many of the fundamental aspects of the subject matter, and constitutes a rounding out and elaboration of the standard parts of algebra, analysis, geometry, logic, probability, set theory, and topology. *Essentially self-contained, the book presents this material with a treatment sensitive to the progress mathematics has made in the last 25 years.*

2010	339 pp.	Paperback
978-81-8489-543-8		₹ 625.00

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.

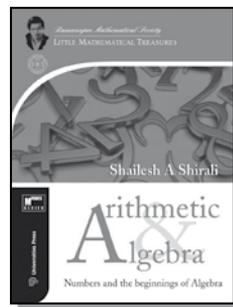
2000	264 pp.	Paperback
978-81-7371-355-2		₹ 480.00

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, Head, Community Mathematics Centre, Rishi Valley School, India

Arithmetic and Algebra: Numbers and the Beginnings of Algebra



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 π ♦ 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

₹ 525.00

Arithmetic and Algebra: The Challenge and Thrill

• FORTHCOMING

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.

Gateway to Modern Mathematics, A: Adventures in Iterations I

Iterations are an exciting topic to study, for the amateur as well as the professional. Many of the iterations in elementary mathematics offer scope for extended investigation. They are like a gateway for learning important themes of modern mathematics, such as fractals and chaos; they offer a route for experiencing the experimental and visually aesthetic side of mathematics.

This book is at an elementary level, and is suitable for students aged 13–18 years. The idea of iteration is introduced together with various associated notions (fixed points, orbits, cycles, limit points, convergence, solution of equations, cobwebbing, and so on). *A large number of examples are studied from the world of arithmetic, algebra and geometry.*

2009 236 pp. Paperback
978-81-7371-626-3 ₹ 550.00

Gateway to Modern Mathematics, A: Adventures in Iteration II

This is the concluding part of the two-volume work on iterations.

The present work continues the study of iterations, started in *Iteration I*, but at a higher level. It examines the insights on iteration provided by differential calculus. Various approaches to the numerical solution of equations using iterations are studied. The book includes a brief account

of two fascinating discoveries made in recent years—the theorems of Li and Yorke, and of Sakovskii. Julia sets of fractional linear maps and quadratic maps, and some associated notions, including the famous Mandelbrot set are introduced.

2010 260 pp. Paperback
978-81-7371-692-8 ₹ 550.00

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, Head, Community Mathematics Centre, Rishi Valley School, 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 ₹ 550.00

Primer on Logarithms, A

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 pp. Paperback
978-81-7371-414-6 ₹ 425.00

Primer on Number Sequences, A

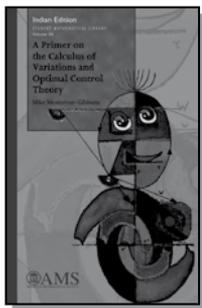
This book offers an excursion into the world of number sequences, objects that occur widely all through Mathematics. *Part I* deals with the generating formula of a sequence, and *Part II* with individual sequences such as the squares, the cubes, the primes, the unit fractions, the Fibonacci numbers, 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 ₹ 425.00

GENERAL MATHEMATICS: MATHEMATICAL METHODS

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

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-optimal 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*

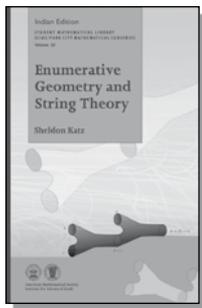
2012 252 pp. Paperback
978-0-8218-8734-9 ₹ 960.00

GEOMETRY

**Enumerative Geometry and
String Theory** 

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

206 pp.

Paperback

978-0-8218-8730-1

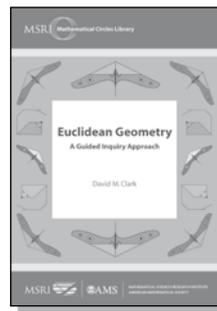
₹ 900.00

Euclidean Geometry: 

A Guided Inquiry Approach

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*

2012 160 pp. Paperback
978-1-4704-2592-0 ₹ 780.00

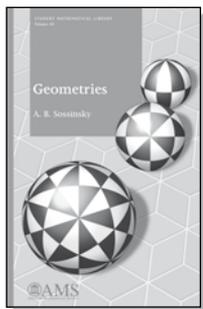
Geometries

© NEW

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 R^3 ♦ 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 S^2 ♦ Other theorems about triangles ♦ Coxeter triangles on the sphere S^2 ♦ Two-dimensional elliptic geometry ♦ Problems ♦ Chapter 7. The Poincaré 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 Poincaré half-plane model ♦ Perpendiculars and parallels ♦ Isometries w.r.t. Möbius 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 Poincaré 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, Poincaré ♦ Hilbert ♦ Chapter 12. Projective Geometry ♦ The projective plane as a geometry ♦ Homogeneous coordinates ♦ Projective transformations ♦ Cross-ratio of collinear points ♦ Projective duality ♦ Conics in RP^2 ♦ 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 RP^2 ♦ The hyperbolic plane as a subgeometry of the projective plane RP^2 ♦ The elliptic plane as a subgeometry of RP^2 ♦ 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*

2012

304 pp.

Paperback

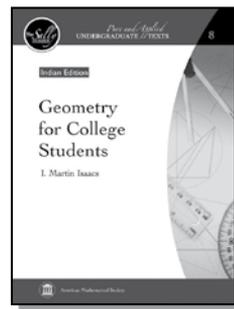
978-1-4704-2595-1

₹ 1,020.00

Geometry for College Students

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

www.universitiespress.com

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	222 pp.	Paperback
978-0-8218-8706-6		₹ 900.00

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		₹ 395.00

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

1984	468 pp.	Paperback
978-81-8489-655-8		₹ 795.00

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*

1985 430 pp. Paperback
978-81-8489-659-6 ₹ 795.00

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 homotopy 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 cohomology of the unitary groups ♦ The homology theory of fibre 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-gap potentials ♦ 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 $\Omega(M)$ ♦ 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 n-body 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 II*

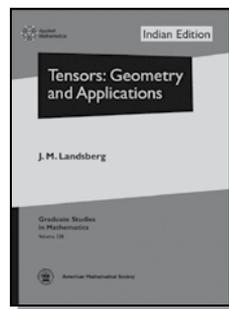
1990 416 pp. Paperback
978-81-8489-660-2 ₹ 795.00

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 for 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

₹ 1,140.00

HARMONIC ANALYSIS

Harmonic Analysis: NEW From Fourier to Wavelets

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 $L_p(T)$ ♦ Project: Weyl's Equidistribution Theorem ♦ Project: Averaging and summability methods ♦ Chapter 5. Mean-square convergence of Fourier series ♦ Basic Fourier theorems in $L_2(T)$ ♦ Geometry of the Hilbert space $L_2(T)$ ♦ 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 \mathbb{C}^N ♦ 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 $S(\mathbb{R})$ ♦ The Schwartz class and the Fourier transform ♦ Convolution and approximations of the identity ♦ The Fourier Inversion Formula and Plancherel ♦ L_p norms on $S(\mathbb{R})$ ♦ Project: A bowl of kernels ♦ Chapter 8. Beyond paradise ♦ Continuous functions of moderate decrease ♦ Tempered distributions ♦ The time–frequency dictionary for $S(\mathbb{R})$ ♦ The delta distribution ♦ Three applications of the Fourier transform ♦ $L_p(\mathbb{R})$ 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 L_p of the Hilbert transform ♦ Weak boundedness on $L_1(\mathbb{R})$ ♦ 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. *$L_p(\mathbb{R})$, density, interchanging limits on \mathbb{R}* ♦ *Bibliography Name index* ♦ *Subject index*

2012	436 pp.	Paperback
978-1-4704-2564-7		₹ 1,140.00

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

www.universitiespress.com

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 ₹ 425.00

Mathematical Masterpieces: Further Chronicles by the Explorers

Arthur Knoebel, Reinhard Laubendacher, Jerry Lodder & David Pengelley

Experience the discovery of mathematics by reading the original work of some of the greatest minds throughout history. Here are the stories of four mathematical adventures, including the Bernoulli numbers as the passage between discrete and continuous phenomena, the search for numerical solutions to equations throughout time, the discovery of curvature and geometric space, and the quest for patterns in prime numbers. Each story is told through the words of the pioneers of mathematical thought. Particular advantages of the historical approach include providing context to mathematical inquiry, perspective to proposed conceptual solutions, and a glimpse into the direction research has taken. *The text is ideal for an undergraduate seminar, independent reading, or a capstone course, and offers a wealth of student exercises with a prerequisite of at most multivariable calculus.*

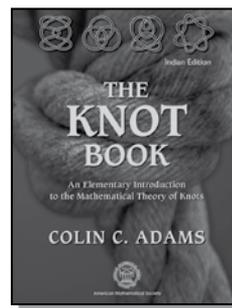
2010 348 pp. Paperback
978-81-8489-542-1 ₹ 675.00

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 307 pp. Paperback
978-0-8218-8723-3 ₹ 1,020.00

LINEAR ALGEBRA

Applied Linear Algebra: The Decoupling Principle 
 (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

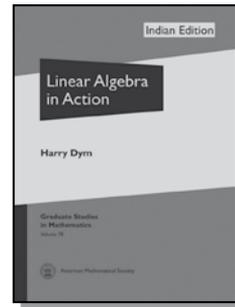
978-0-8218-6887-4

₹ 1,080.00

Linear Algebra in Action 

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	545 pp.	Paperback
978-0-8218-8719-6		₹ 1,200.00

Matrix Groups for Undergraduates

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.

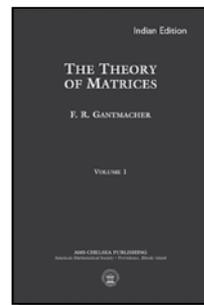
Contents: Why study matrix groups? ♦ Matrices ♦ All matrix groups are real matrix groups ♦ The orthogonal groups ♦ The topology of matrix groups ♦ Lie algebras ♦ Matrix exponentiation ♦ Matrix groups are manifolds ♦ The Lie bracket ♦ Maximal tori ♦ *Bibliography* ♦ *Index*

2011	176 pp.	Paperback
978-0-8218-6892-8		₹ 660.00

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.

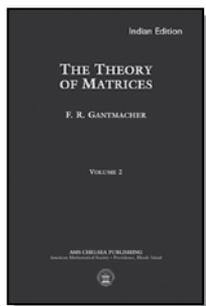
Contents: Matrices and operations on matrices ♦ The algorithm of Gauss and some of its applications ♦ Linear operators in an n-dimensional vector space The characteristic polynomial and the minimal polynomial of a matrix ♦ Functions of matrices ♦ Equivalent transformations of polynomial matrices ♦ Analytic 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		₹ 1,080.00

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 differential equations: Systems of linear differential 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 infinitesimal calculus of Volterra ♦ Differential systems in a complex domain. General properties ♦ The multiplicative integral in a complex domain ♦ Isolated

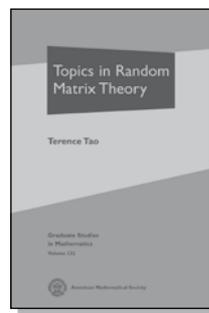
singular points ♦ Regular singularities ♦ Reducible analytic systems ♦ Analytic functions of several matrices and their application to the investigation of Differential systems. The papers of Lappo-Danilevskii ♦ The problem of Routh-Hurwitz and related questions: Introduction ♦ Cauchy indices ♦ Routh's 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 polynomial ♦ Infinite Hankel matrices of finite rank ♦ Determination of the index of an arbitrary rational fraction by the coefficients 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		₹ 960.00

Topics in Random Matrix Theory

Terence Tao

University of California, Los Angeles, USA



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

www.universitiespress.com

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*

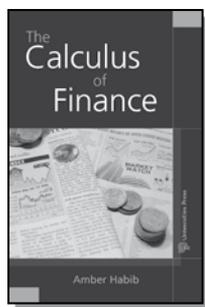
2012	296 pp.	Paperback
978-1-4704-2582-1		₹ 960.00

MATHEMATICAL FINANCE

Calculus of Finance, The

Amber Habib

Professor, Mathematical Sciences Foundation,
New Delhi, India



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*

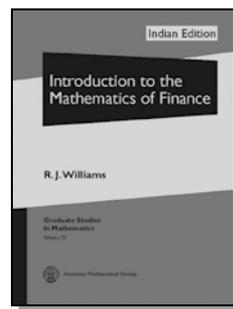
2011	296 pp.	Paperback
978-81-7371-723-9		₹ 550.00

Introduction to the Mathematics of Finance

AMS

R J Williams

University of California, San Diego, La Jolla, USA



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 L_p -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		₹ 640.00

Mathematics of Finance, The: Modeling and Hedging

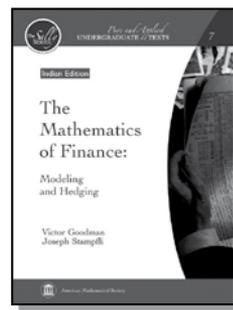


Victor Goodman

Indiana University, Bloomington, USA

Joseph Stampfli

Indiana University, Bloomington, USA



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		₹ 960.00

www.universitiespress.com

Mathematics of Financial Obligations

A V Mel'nikov

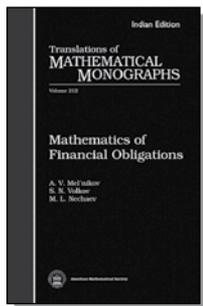
Steklov Institute of Mathematics, Moscow, Russia

S N Volkov

Steklov Institute of Mathematics, Moscow, Russia

M L Nechaev

Steklov Institute of Mathematics, Moscow, Russia



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

196 pp.

Paperback

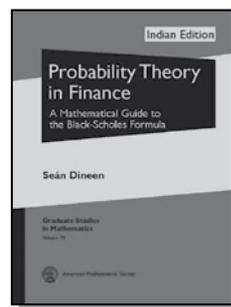
978-0-8218-9184-1

₹ 900.00

Probability Theory in Finance: A Mathematical Guide to the Black-Scholes Formula

Seán Dineen

University College Dublin, Ireland



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		₹ 1,075.00

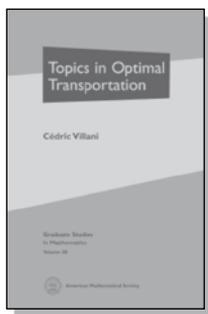
MATHEMATICAL METHODS

Topics in Optimal Transportation




Cédric Villani

École Normale Supérieure de Lyon, France



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 view on optimal transportation ♦ Entropy production and transportation inequalities ♦ Problems ♦ Bibliography ♦ Table of short statements ♦ Index

2003	392 pp.	Paperback
978-1-4704-2562-3		₹ 1,080.00

MATHEMATICAL MODELLING

Mathematical Modelling: A Case Studies Approach



Reinhard Illner

University of Victoria, Canada

C Sean Bohun

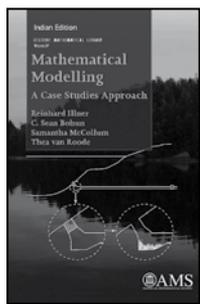
University of Victoria, Canada

Samantha McCollum

University of Victoria, Canada

Thea van Roode

University of Victoria, Canada



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		₹ 660.00

Mathematics in Nature

John A Adam

Professor of Mathematics, Old Dominion University,
Norfolk, USA

Generously illustrated, written in an informal style, and replete with examples from everyday life, this book is an excellent and undaunting introduction to the ideas and methods of mathematical modelling. It illustrates how mathematics can be used to formulate and solve puzzles observed in nature and to interpret the solutions. Readers will develop an understanding of the symbiosis that exists between basic scientific principles and their mathematical expressions as well as a deeper appreciation for such natural phenomena as cloud formations, halos and glories, tree heights and leaf patterns, butterfly and moth wings, and even puddles and mud cracks.

Developed out of a university course, this book makes an ideal supplemental text for courses in applied mathematics and mathematical modelling. It will also appeal to mathematics educators and enthusiasts at all levels, and is designed so that it can be dipped into at leisure.

2004	400 pp.	Paperback
978-81-7371-508-2		₹ 675.00

MATHEMATICAL PHYSICS

Mathematical Physics: Advanced Topics

S D Joglekar

Professor of Physics, Indian Institute of Technology
Kanpur, Kanpur, India

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 (except India) by CRC Press LLC, USA, Taylor and Francis Group

2006	264 pp.	Paperback
978-81-7371-560-0		₹ 375.00

Mathematical Physics: The Basics

S D Joglekar

Professor of Physics, Indian Institute of Technology Kanpur, Kanpur, India

This book covers the basic mathematical techniques that are essential at the master's level in physics and chemistry, and provides the basic underlying preparation needed for any research student in either branch. It deals with vectors, tensors, Cartesian coordinates, Lorentz tensors, curvilinear coordinates, linear vector spaces, linear operators, matrices, complex variables and their applications at an advanced level. In the companion volume titled, Advanced Topics, more advanced topics are dealt with to cover the entire spectrum of requirement for a course on mathematical physics at the postgraduate or research level.

Contents: *Preface* ♦ Coordinate Transformations, Vectors and Cartesian Tensors ♦ Lorentz Transformation, 4-Vectors and 4-Tensors ♦ Curvilinear Coordinates ♦ Linear Vector Spaces – I ♦ Linear Vector Spaces – II: Linear Operators ♦ Complex Variables – I ♦ Complex Variables – II ♦ Complex Variables – III ♦ *Index*

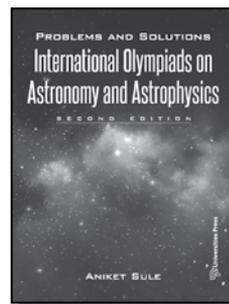
Distributed worldwide (except India) by CRC Press LLC, USA, Taylor and Francis Group

2005	256 pp.	Paperback
978-81-7371-422-1		₹ 375.00

Problems and Solutions: NEW International Olympiads on Astronomy and Astrophysics

Aniket Sule

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

www.universitiespress.com

- 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*

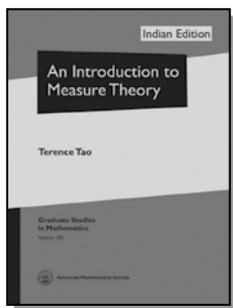
2015 304 pp. Paperback
978-81-7371-980-6 ₹ 450.00

MEASURE THEORY

Introduction to Measure Theory, An

Terence Tao

University of California, Los Angeles, USA



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 ₹ 900.00

Measure and Integration

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 ₹ 1,020.00

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 relegated to an appendix; that more attention is paid to the role of algebras than is customary; and that the metric defining the distance

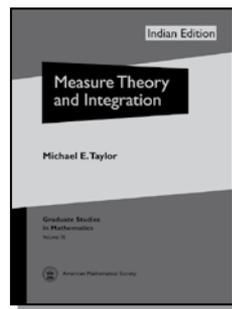
between sets as the measure of their symmetric difference is exploited more than is customary.

2010 232 pp. Paperback
978-81-8489-615-2 ₹ 550.00

Measure Theory and Integration

Michael E Taylor

University of North Carolina, Chapel Hill, USA



This self-contained treatment of measure and integration begins with a brief review of the Riemann integral and proceeds to a construction of Lebesgue measure on the real line. From there the reader is led to the general notion of measure, to the construction of the Lebesgue integral on a measure space, and to the major limit theorems, such as the Monotone and Dominated Convergence Theorems. The treatment proceeds to L_p spaces, normed linear spaces that are shown to be complete (i.e., Banach spaces) due to the limit theorems. Particular attention is paid to L_2 spaces as Hilbert spaces, with a useful geometrical structure.

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

This text will prepare graduate students for more advanced studies in functional analysis, harmonic

analysis, stochastic analysis, and geometric measure theory.

Contents: The Riemann integral ♦ Lebesgue measure on the line ♦ Integration on measure spaces ♦ L_p spaces ♦ The Caratheodory construction of measures ♦ Product measures ♦ Lebesgue measure on \mathbb{R}^n and on manifolds ♦ Signed measures and complex measures L_p spaces, II ♦ Sobolev spaces ♦ Maximal functions and a.e. phenomena ♦ Hausdorff's r -dimensional measures ♦ Radon measures ♦ Ergodic theory ♦ Probability spaces and random variables ♦ Wiener measure and Brownian motion ♦ Conditional expectation and martingales ♦ *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	319 pp.	Paperback
978-0-8218-8718-9		₹ 1,020.00

Modern Theory of Integration, A

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		₹ 1,285.00

**Solutions Manual to a
Modern Theory of Integration**

AMS

2010 80 pp. Paperback
978-0-8218-5216-3 ₹ 615.00

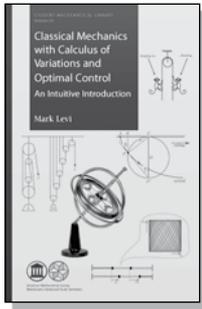
MECHANICS

**Classical Mechanics with Calculus of
Variations and Optimal Control: An
Intuitive Introduction**

NEW AMS

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 R^4 ♦ 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 ♦ Poincaré’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 \Leftrightarrow 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 Poincaré'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*

2014	300 pp.	Paperback
978-1-4704-2598-2		₹ 960.00

Foundations of Mechanics (Second Edition)



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		₹ 2,005.00

NUMBER THEORY

1001 Problems in Classical Number Theory



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 ₹ 1,075.00

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

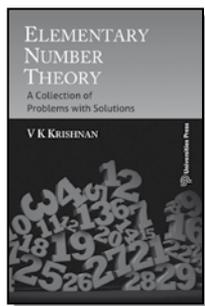
set of simultaneous equations Irregular numbers ♦ Squaring the circle ♦ Modular equations and approximations to Π ♦ On the integral $\int x^0 \tan^{-1} t/t dt$ ♦ On the number of divisors of a number On the sum of the square roots of the first n natural numbers ♦ On the product $\prod_{n=0}^{\infty} [1 + (x/a+nd)^3]$ ♦ Some definite integrals ♦ Some definite integrals connected with Gauss's sums ♦ Summation of a certain series ♦ New expressions for Riemann's functions $\xi(s)$ and $\Xi(t)$ 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 ₹ 1,140.00

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		₹ 450.00

First Steps in Number Theory: A Primer on Divisibility

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		₹ 350.00

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		₹ 725.00

Number Theory

V Kumar Murty
University of Toronto, Canada

Michel Waldschmidt
Universite Pierre et Marie Curie, Paris, France

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		₹ 1,065.00

Number Theory

Shailesh A Shirali

Head, Community Mathematics Centre, Rishi Valley School, 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*

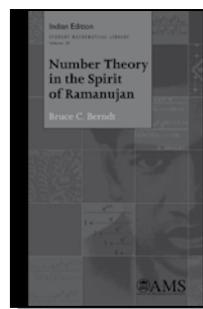
2003	112 pp.	Paperback
978-81-7371-454-2		₹ 295.00

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 187 pp. Paperback
978-0-8218-8731-8 ₹ 900.00

Pi: A Biography of the World's Most Mysterious Number

Alfred S Posamentier

Dean, School of Education; Professor of Mathematics, City College, City University of New York, USA

Ingmar Lehmann

Department of Mathematics, Humboldt University, Berlin, Germany

Pi—this seemingly mundane number—holds a world of mystery, which has fascinated mathematicians from ancient times to the present. What is Pi? What is the real value of Pi? How do mathematicians determine the value of Pi? In what ways is Pi used? How was it calculated in ancient times? Its elusive nature has led investigators over the years to ever-closer approximations.

In this delightful introduction to one of math's most interesting phenomena, *Drs Posamentier and Lehmann* review Pi's history from pre-biblical times to the twenty-first century and the many amusing and often mind-boggling attempts to estimate its precise value. This enlightening, intriguing, and stimulating approach to mathematics will entertain and fascinate readers while honing their mathematical literacy.

Contents: *Acknowledgments* ♦ *Preface* ♦ *What Is The History of Calculating the Value of Enthusiasts Curiosities* ♦ *Applications of Paradox in Epilogue* ♦ *Afterword by Dr Herbert A Hauptman* ♦ *Appendix A: A Three-Dimensional Example of a Rectilinear Equivalent to a Circular Measurement* ♦ *Appendix B: Ramanujan's Work* ♦ *Appendix C: Proof That $e\pi > \pi e$* ♦ *Appendix D: A Rieo around the Regular Polygons* ♦ *References* ♦ *Index*

2006 324 pp. Paperback
978-81-7371-561-7 ₹ 625.00

Prime Numbers and Their Distribution, The

NEW

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		₹ 900.00

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		₹ 395.00

NUMBER THEORY AND COMBINATORICS

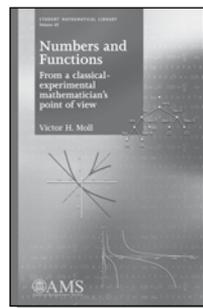
Numbers and Functions: From a Classical-Experimental Mathematician’s Point of View

NEW

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
 $\zeta(2n)$ ♦ Apéry's constant $\zeta(3)$ ♦ *Bibliography* ♦ *Index*

2012 504 pp. Paperback
 978-1-4704-2596-8 ₹ 1,200.00

NUMBER THEORY AND GEOMETRY

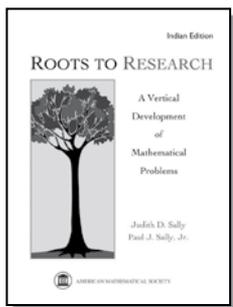
Roots to Research: A Vertical Development of Mathematical Problems

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 338 pp. Paperback
 978-0-8218-8725-7 ₹ 1,080.00

NUMERICAL ANALYSIS

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 technological 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

www.universitiespress.com

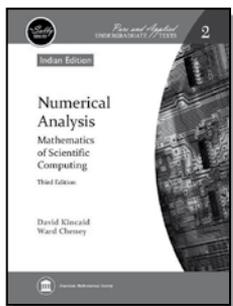
Systems of Linear Equations ♦ Numerical Solution of Ordinary Differential Equations ♦ Matrix Eigen value Problem ♦ Finite Difference Methods for Solving BVP Associated with Partial Differential Equations ♦ Miscellaneous topics ♦ Programs ♦ *Appendix A: The Programming Language C* ♦ *Appendix B: Some Selected Programs* ♦ *Index*

2003	512 pp.	Paperback
978-81-7371-451-1		₹ 495.00

Numerical Analysis: Mathematics of Scientific Computing (Third Edition)

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 Arithmetic ♦ 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		₹ 2,005.00

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++.

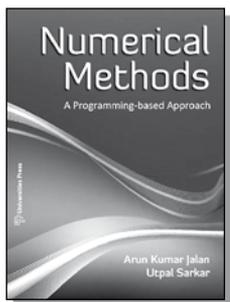
Contents: *List of Programs* ♦ *Preface* ♦ *Acknowledgements* ♦ Numbers, Errors and Accuracy ♦ Iterative Process ♦ Solution of Nonlinear Equations ♦ Finite Differences and Interpolation ♦ Numerical Differentiation ♦ Numerical Integration ♦ System of Linear Equations ♦ Eigenvalues and eigenvectors ♦ Differential Equations ♦ A Primer to Computer Programming ♦ Appendix: C++ Programs ♦ *Answers to Problems* ♦ *Bibliography* ♦ *Index*

2004	504 pp.	Paperback
978-81-7371-472-6		₹ 495.00

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



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 teacher resources such as solutions manual and PowerPoint slides are available at www.universitiespress.com

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		₹ 395.00

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 978-81-7371-714-7	420 pp.	Paperback ₹ 750.00
---------------------------	---------	-----------------------

Engineering Optimization: A Modern Approach*Ranjan Ganguli*

Professor, Department of Aerospace Engineering,
Indian Institute of Science, Bengaluru, India



The deployment of optimization techniques at the conceptual design stage of complex technical systems is today no longer a desirable trait but an absolute necessity.

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.

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 (except India)
by CRC Press LLC, USA, Taylor and Francis Group*

2012	268 pp.	Paperback
978-81-7371-739-0		₹ 395.00

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 Ilysses' Problem* ♦ *Bibliography* ♦ *Index*

2010	558 pp.	Paperback
978-81-8489-524-7		₹ 750.00

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		₹ 375.00

OPERATOR THEORY

Problems in Operator Theory 

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	386 pp.	Paperback
978-0-8218-8716-5		₹ 1,140.00

OPTIMISATION

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		₹ 595.00

PROBABILITY

Imaginary Tale, An: The Story of $\sqrt{-1}$

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		₹ 495.00

Introduction to Probability (Second Edition)



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.

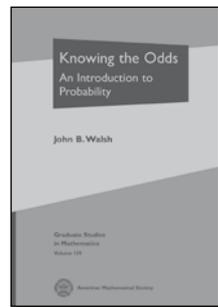
Contents: Reprint of entire volume ♦ Discrete probability distributions (Chapter 1) ♦ Continuous probability densities (Chapter 2) ♦ Combinatorics (Chapter 3) ♦ Conditional probability (Chapter 4) ♦ Important distributions and densities (Chapter 5) ♦ Expected value and variance (Chapter 6) ♦ Sums of 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		₹ 1,470.00

Knowing the Odds: An Introduction to Probability



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

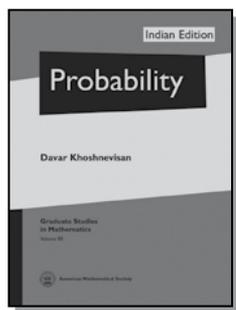
◆ The Weak and Strong Laws ◆ Normal Numbers ◆ Sequences of Random Variables: Existence ◆ Sigma Fields as Information ◆ Another Look at Independence ◆ Zero-one Laws ◆ Chapter 6. Convergence in Distribution and the CLT ◆ Characteristic Functions ◆ Convergence in Distribution ◆ Levy's Continuity Theorem ◆ 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*

2012 440 pp. Paperback
978-1-4704-2585-2 ₹ 1,140.00

Probability

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 224 pp. Paperback
978-0-8218-9181-0 ₹ 900.00

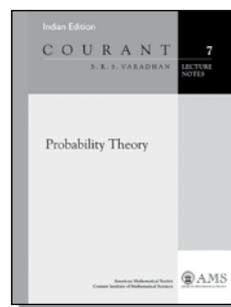
Probability Theory

 NEW

 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.

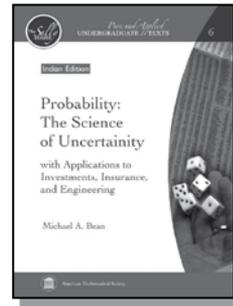
S. R. S. Varadhan is the winner of the 2007 Abel Prize. Varadhan was awarded the prize "for his fundamental contributions to probability theory and in particular for creating a unified theory of large deviations".

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		₹ 900.00

**Probability: The Science of Uncertainty:
with Applications to Investments,
Insurance and Engineering** 

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™. 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

www.universitiespress.com

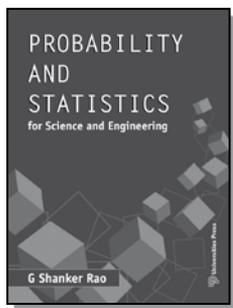
◆ Random Variables and Probability Distributions
 ◆ Special Discrete Distributions ◆ Special Continuous
 ◆ Distributions ◆ Transformations of Random Variables
 ◆ Sums and Products of Random Variables ◆ Mixtures and Compound Distributions
 ◆ The Markowitz ◆ Investment Portfolio Selection Model
 ◆ *Appendixes* ◆ *Answers to Selected Exercises*
 ◆ *Index*

2012 448 pp. Paperback
 978-0-8218-9177-3 ₹ 1,140.00

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 ◆ Queue-

ing Theory ◆ Stochastic Process ◆ *Appendix* ◆ *Bibliography* ◆ *Index*

2011 524 pp. Paperback
 978-81-7371-744-4 ₹ 495.00

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 674 pp. Paperback
 978-81-7371-887-8 ₹ 450.00

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		₹ 325.00

PROBLEMS FOR INTERMEDIATE AND UNDERGRADUATE

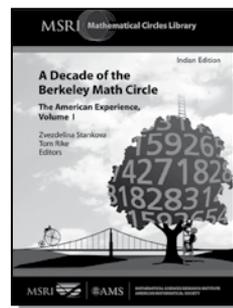
Decade of the Berkeley Math Circle, A: The American Experience, Volume I

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 326 pp. Paperback
978-0-8218-8728-8 ₹ 1,020.00

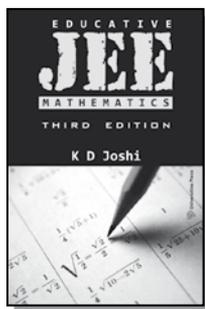
Educative JEE

© NEW

(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.

Contents: *Preface to the Third Edition* ♦ *Preface to the First Edition* ♦ *Disclaimer about JEE* ♦ **Part-I Precalculus Mathematics:** Counting Problems ♦ Basic Algebra ♦ Theory Of Equations ♦ Number Theory ♦ Binomial Identities ♦ Inequalities ♦ Trigonometric Identities ♦ Geometry ♦ Coordinate Geometry ♦ Trigonometric Equations ♦ Solution Of Triangles ♦ Heights And Distances ♦ *Answers to exercises in Part - I* ♦ **Part -II Calculus, Vectors, Probability, Review:** Maxima, Minima And Concavity ♦ Trigonometric Optimisation ♦ Limits, Continuity and Derivatives ♦ Theoretical Calculus ♦ Areas and Antiderivatives ♦ Definite Integrals ♦ Differential Equations ♦ Functional Equations and Relations ♦ Vectors ♦ Finitistic Probability ♦ Infinitistic Probability ♦ Miscellaneous Tips and Review ♦ *Answers to exercises in Part - II* ♦ *Appendix 1 More on matrices* ♦ *Appendix 2 Solid coordinate geometry* ♦ *Index*

2015 1100 pp. Paperback
978-81-7371-945-5 ₹ 995.00

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	325 pp.	Paperback
978-0-8218-8727-1		₹ 1,020.00

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		₹ 600.00

Mathematical Olympiad Challenges (Second Edition)

Titu Andreescu

American Mathematics Competitions, University of Nebraska, Lincoln, USA

Răzvan Gelca

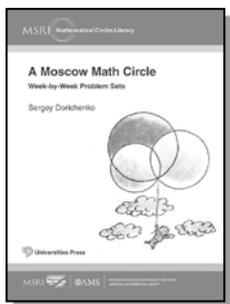
Texas Tech. University, Department of Mathematics and Statistics, Lubbock, USA

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	282 pp.	Paperback
978-87-322-1485-4		₹ 595.00

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 known 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 sessions, 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		₹ 395.00

QUANTUM COMPUTING

**Classical and Quantum
Computation**
*A Yu Kitaev*

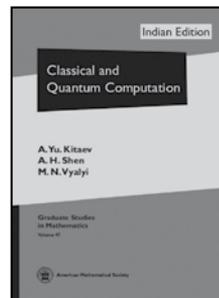
California Institute of Technology, Pasadena, USA

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		₹ 960.00

Cross Disciplinary Advances in Quantum Computing

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		₹ 900.00

QUANTUM GRAPHS

Introduction to Quantum Graphs



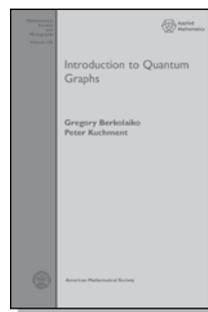


Gregory Berkolaiko

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*

2013 288 pp. Paperback
978-1-4704-2599-9 ₹ 960.00

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 Sturm-Liouville Theory ♦ Integral Transforms: Generalized Functions ♦ Partial Differential Equations ♦ Green's Functions ♦ Probability and Statistics ♦ Elements of Group Theory ♦ *Appendix* ♦ *References* ♦ *Index*

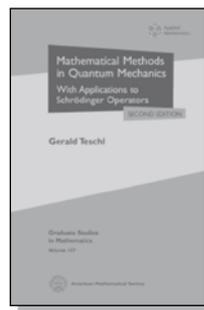
1998 716 pp. Paperback
978-81-7371-089-6 ₹ 795.00

Mathematical Methods in Quantum Mechanics: With Applications to Schrodinger Operators



(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 L_p 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–Nevalinna 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. Schrödinger Operators ♦ Chapter 7. The free Schrödinger operator ♦ The Fourier transform ♦ Sobolev spaces ♦ The free Schrödinger 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 Schrödinger 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 Schrödinger operators ♦ Chapter 10. One-particle Schrödinger operators ♦ Self-adjointness and spectrum ♦ The hydrogen atom ♦

Angular momentum ♦ The eigenvalues of the hydrogen atom ♦ Nondegeneracy of the ground state ♦ Chapter 11. Atomic Schrödinger operators ♦ Self-adjointness ♦ The HVZ theorem ♦ Chapter 12. Scattering theory ♦ Abstract theory ♦ Incoming and outgoing states ♦ Schrödinger 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*

2014	320 pp.	Paperback
978-1-4704-2563-0		₹ 1,020.00

SET THEORY

Basic Set Theory

NEW

AMS

A Shen

Independent University of Moscow, Russia

N K Vereshchagin

Moscow State Lomonosov University, Russia



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*

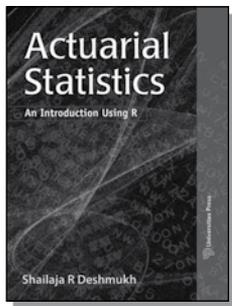
2014	128 pp.	Paperback
978-1-4704-1918-9		₹ 900.00

STATISTICS

Actuarial Statistics: An Introduction Using R

Shailaja R Deshmukh

Professor, Department of Statistics, Savitribai Phule Pune University, Pune, India



Actuarial science is an interdisciplinary science comprising four subjects—mathematics, statistics, economics and finance. Statistics plays a key role in laying the foundation of actuarial calculations in the presence of uncertainty in the mortality pattern of society and under varying economical conditions. *Actuarial calculations mainly involve determination of premium rates and computation of reserves.*

This book discusses the application of various basic concepts and statistical techniques in the determination of premiums and reserves for a variety of standard insurance and annuity products, under a variety of conditions. *Topics dealt with include* application of utility theory to establish the feasibility of the insurance business, short-term risk models, distribution theory related to the future life time random variable, construction of aggregate and select life table, important concepts of financial mathematics, annuities certain, terms, endowment and whole life insurance products, monthly, quarterly, semi-annual and annual life annuities.

Contents: *Preface* ♦ Insurance Business ♦ Introductory Statistics ♦ Feasibility of Insurance Business and Risk Models for Short Term ♦ Future Lifetime Distribution and Life Tables ♦ Actuarial Present Values of Benefit in Life Insurance Products ♦ Annuities ♦ Premiums ♦ Reserves ♦ Multiple Life Contracts ♦ *Answers to Exercises* ♦ *References* ♦ *Index*

2010	472 pp.	Paperback
978-81-7371-690-4		₹ 595.00

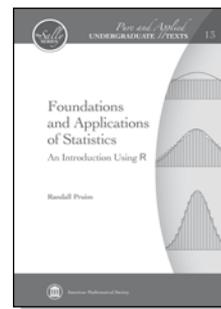
Foundations and Applications of Statistics: An Introduction Using R

NEW

AMS

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 indispensable 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*

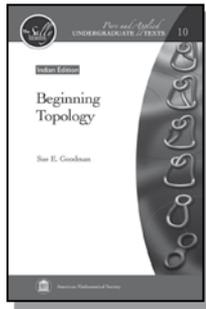
2011	640 pp.	Paperback
978-1-4704-2577-7		₹ 1,320.00

TOPOLOGY

Beginning Topology

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 236 pp. Paperback
978-0-8218-8705-9 ₹ 960.00

Computational Topology: An Introduction

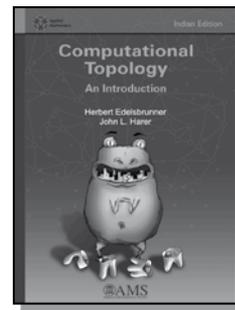


Herbert Edelsbrunner

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 ₹ 960.00

www.universitiespress.com

Elementary Topology: Problem Textbook

O Ya Viro

Stony Brook University, New York, USA

O A Ivanov

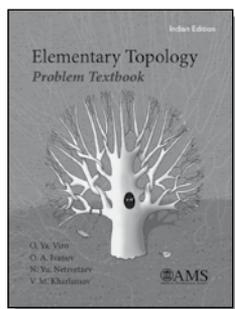
Steklov Institute of Mathematics, St. Petersburg,
Russia

N Yu Netsvetsev

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

400 pp.

Paperback

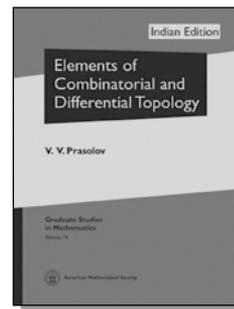
978-0-8218-8726-4

₹ 1,140.00

Elements of Combinatorial and Differential Topology

V V Prasolov

Independent University of Moscow, Russia



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		₹ 1,020.00

First Course in Topology, A: Continuity and Dimension

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		₹ 660.00

Mapping Degree Theory

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

www.universitiespress.com

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	244 pp.	Paperback
978-0-8218-8714-1		₹ 960.00

Twenty-Four Hours of Local Cohomology

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		₹ 1,075.00

TRIGONOMETRY

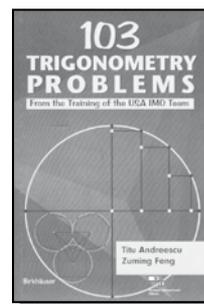
103 Trigonometry Problems

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		₹ 550.00

Trigonometric Delights

Eli Maor

Eli Maor rejects the usual arid descriptions of the sine and cosine functions and their trigonometric relatives. *He brings the subject to life in a compelling blend of mathematics, history, and biography.* From the 'proto-trigonometry' of the Egyptian pyramid builders to Renaissance Europe's quest for more accurate artillery, from the earliest known trigonometric table, carved on a clay tablet by an unknown Babylonian scholar, to Fourier's famous theorem, which finally explained the source of musical harmony, here is a rich tapestry of almost four thousand years of trigonometric history. *Trigonometric Delights* will change forever our view of a once-dreaded subject.

2000	256 pp.	Paperback
978-81-7371-206-7		₹ 475.00

ENCYCLOPAEDIA

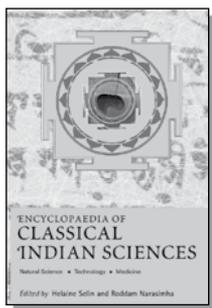
Encyclopaedia of Classical Indian Sciences

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.*

Contents: Preface ♦ Acknowledgements ♦ Agriculture
♦ Alchemy ♦ Algebra: Bijaganita ♦ Arithmetic:

Patiganita ♦ Armillary Spheres ♦ Aryabhata ♦ Astrology ♦ Astronomical Instruments ♦ Astronomy ♦ Astronomy in the Indo-Malay Archipelago ♦ Atomism ♦ Atreya ♦ Bakhshali Manuscript ♦ Baudhayana ♦ Bhaskara I ♦ Bhaskara II ♦ Al-Biruni ♦ Brahmagupta ♦ Bricks ♦ Calculus ♦ Calendars ♦ Candrasekhara Samanta ♦ Caraka ♦ City Planning ♦ Colonialism and Science ♦ Combinatorics in Indian Mathematics ♦ Decimal Notation ♦ Desantara ♦ Devacarya ♦ Dyes ♦ East and West ♦ East and West: India in the Transmission of ♦ Knowledge from East to West ♦ Eclipses ♦ Environment and Nature ♦ Epilepsy ♦ Ethnobotany ♦ Forestry ♦ Geography ♦ Geometry ♦ Gnomon ♦ Haridatta ♦ Irrigation in India and Sri Lanka ♦ Jagannatha Samrat ♦ Jai Singh ♦ Jayadeva ♦ Kamalakara ♦ Knowledge Systems: Local Knowledge ♦ Knowledge Systems ♦ Lalla ♦ Lunar Mansions in Indian Astronomy ♦ Madhava of Sangamagrama ♦ Magic and Science ♦ Magic Squares in Indian Mathematics ♦ Mahadeva ♦ Mahavira ♦ Mahendra Suri ♦ Makaranda ♦ Maps and Mapmaking ♦ Mathematics ♦ Medical Ethics ♦ Medicine: Ayurveda ♦ Medieval Science and Technology ♦ Metallurgy: Bronzes of South India ♦ Metallurgy: Iron and Steel ♦ Metallurgy: Zinc and its Alloys: Ancient Smelting Technology ♦ Meteorology ♦ Military Technology ♦ Munisvara ♦ Narayana Pandita ♦ Navigation ♦ Number Theory ♦ Observatories ♦ Paksa ♦ Parameswara ♦ Paulisa ♦ Physics ♦ Pi in Indian Mathematics ♦ Precession of the Equinoxes ♦ Putumana Somayaji: ♦ Rainwater Harvesting ♦ Ramanujan ♦ Rationale in Indian Mathematics ♦ Rockets and Rocketry ♦ Salt ♦ Saikara Variyar ♦ Satananda ♦ Science as a Western Phenomenon ♦ Sexagesimal System ♦ Sphujidhvaja ♦ Sridhara ♦ Sripati ♦ Sulbasutras ♦ Suryasiddhanta ♦ Susruta ♦ Technology and Culture ♦ Textiles ♦ Time ♦ Trigonometry ♦ Vakyakarana ♦ Values and Science ♦ Varahamihira ♦ Vatesvara ♦ Weights and Measures in the Indus Valley ♦ Western Dominance ♦ Wind Power ♦ Yavanesvara ♦ Yoga ♦ Yuktibhasa of Jyesthadeva ♦ Zero ♦ Zij ♦ Zodiac ♦ List of Contributors ♦ Index

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

2007 978-81-7371-555-6	492 pp.	Hardback ₹ 1,100.00
---------------------------	---------	------------------------

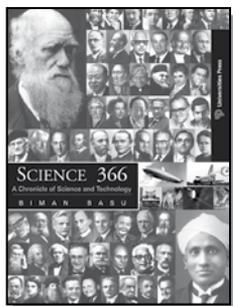
Fast Science Facts*Surendra Verma*

This book is a unique collection of basic science facts, concepts and ideas presented in an easy-to-use format. It incorporates the best features of science dictionaries, encyclopedias, handbooks, data books and textbooks.

1998	248 pp.	Paperback
978-81-7371-092-6		₹ 450.00

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

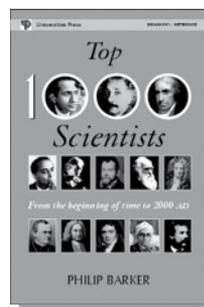
entry for the date of founding or inauguration of a scientific institution gives a brief summary of the activities and achievements of the institution. All the entries are cross-referenced for easy navigation.

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

2008	712 pp.	Paperback
978-81-7371-607-2		₹ 1,225.00

Top 1000 Scientists: From the Beginning of Time to 2000 AD*Philip Barker*

Scholar of the History of Science

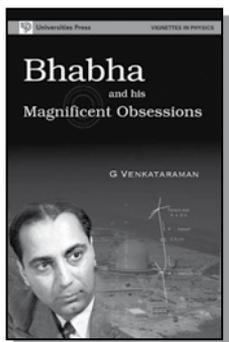


The history of scientific progress is full of surprises. How many people realise, for example, that the term ‘electricity’ was coined in 1646?, or that Benjamin Franklin invented the lightning conductor?, that even a seemingly recent invention such as the television turns out to have been patented in 1884.

This book covers science and scientists from the earliest recorded days right up to the new millennium, and will become an invaluable reference work as well as a delight to dip into.

2002	448 pp.	Paperback
978-81-7371-210-4		₹ 750.00

BIOGRAPHIES**Bhabha and His Magnificent Obsessions***G Venkataraman*



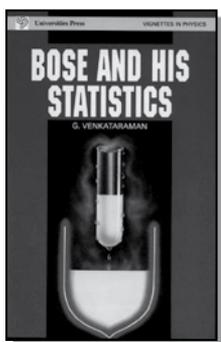
This book is about the remarkable scientist Homi Jehangir Bhabha who, at the age of eighteen, went to Cambridge to study physics and started his research career there. In 1939, when Bhabha came to India on a short vacation, he was forced to stay on as the Second World War broke out. This was, of course, 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 ₹ 350.00

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 ₹ 250.00

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 ₹ 250.00

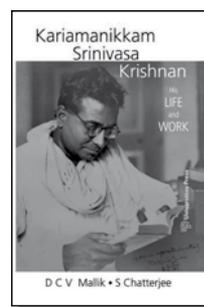
Kariamanikkam Srinivasa Krishnan: His Life and Work

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

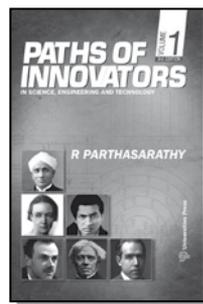
2011 978-81-7371-748-2	516 pp.	Hardback ₹ 1,150.00
---------------------------	---------	------------------------

2011 978-81-7371-749-9	516 pp.	Paperback ₹ 750.00
---------------------------	---------	-----------------------

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

www.universitiespress.com

Mathematics: Abel, Henrik ♦ Bessel, Friedrich ♦ Boole, George ♦ Bradley, James ♦ Cantor, Georg ♦ Cauchy, Augustin ♦ Chandrasekar, S ♦ Descartes, Rene ♦ Erdos, Paul ♦ Euler, Leonhard ♦ Fourier, Joseph ♦ Galois, Evariste ♦ Gauss, Carl ♦ Halley, Edmund ♦ Hawking, Stephen ♦ Hilbert, David ♦ Herschel, John ♦ Herschel, William ♦ Lagrange, Joseph ♦ Laplace, Pierre ♦ Leibniz, Gottfried ♦ Pascal, Blaise ♦ Poincare, Henri ♦ Ramachandra, Yasudas ♦ Ramanujan, Srinivasa ♦ Riemann, Bernhard ♦ Wiener, Norbert

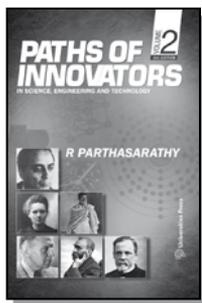
Chemistry: Arrhenius, Svante ♦ Avogadro, Amedeo ♦ Berthollet, Claude ♦ Berzelius, Jacob ♦ Black, Joseph ♦ Bunsen, Robert ♦ Dalton, John ♦ Dulong, Pierre ♦ Fourcroy, Antoine ♦ Gay-Lussac, Joseph ♦ Hodgkin, Dorothy ♦ Hofmann, August von ♦ Joliot-Curie, Irene ♦ Kekule, Friederich ♦ Lavoisier, Antoine ♦ Liebig, Justus von ♦ Mendeleev, Dmitri ♦ Perkin, William

2012	456 pp.	Paperback
978-81-7371-750-5		₹ 650.00

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 Bekeesy, 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 ♦

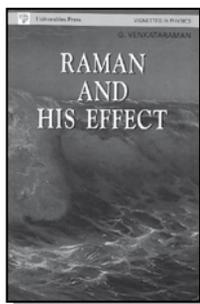
Priestley, Joseph ♦ Ray, Acharya PC ♦ Seshadri, TR ♦ Soddy, Frederick ♦ Urey, Harold ♦ Van't Hoff, Jacobus ♦ Venkataraman K

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 ₹ 650.00

Raman and His Effect

G Venkataraman

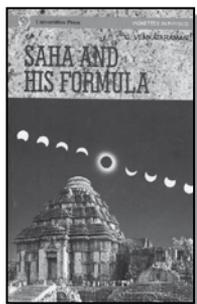


This book deals with the famous Scattering Effect discovered by Sir C. V. Raman. It gives us deep insights into the character of this famous scientist and vividly describes the circumstances surrounding the discovery.

1995 108 pp. Paperback
978-81-7371-008-7 ₹ 250.00

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 ₹ 275.00

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 ₹ 160.00

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

www.universitiespress.com

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.

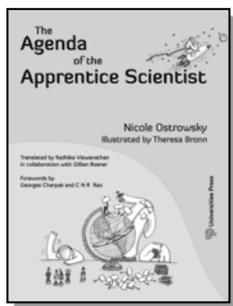
1999 212 pp. Paperback
978-81-7371-146-6 ₹ 350.00

GENERAL INTEREST

Agenda of the Apprentice Scientist, The

Nicole Ostrowsky

Professor Emeritus, University of Nice Sophia
Antipolis, France



Here are 365 activities to discover that science is a part of our daily life, that you can take part in it with pleasure, that it can be easy, sometimes surprising and funny, and always accessible to everyone, from 7 to 107. All you need to have is a curiosity about the world around you.

Throw yourself into this adventure across the sciences, go at your own pace, follow your fancy and don't necessarily stick to the days of the year. Keep in mind, however, that some activities take place over a couple of days—you will see this as you go. Set your imagination free, do or redo the experiments as you wish, and try and invent better ways to make them work. If you have problems, if you need a clearer explanation, or if you want to share your ideas, you can write to Nicole.Ostrowsky@unice.fr or visit <http://apprenticescientist.com>

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.

We recommend that you visit the link:
<http://apprenticescientist.com/#/topics/3922325>

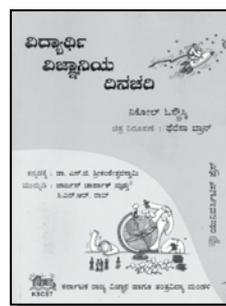
Available in print and e-book formats.
For details, visit www.universitiespress.com.

2012 396 pp. Paperback
978-81-7371-753-6 ₹ 695.00

Agenda of the Apprentice Scientist, The (Kannada)

Nicole Ostrowsky

Professor Emeritus, University of Nice Sophia
Antipolis, France



2012 396 pp. Paperback
978-81-7371-921-9 ₹ 595.00

BITS of Success

Harsh Bhargava

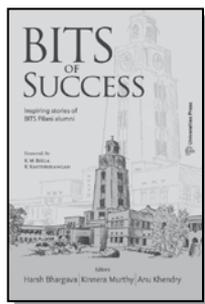
Professor, IBS Hyderabad

Kinnera Murthy

Former Dean, Administrative Staff College of India,
Hyderabad, strategy consultant

Anu Khendry

Consultant and trainer, agile methodologies and
project management



The creators of Hotmail, FoodKing, Bharat Forge, MapmyIndia, Onida, TheFind, VarshaJal and the Buddh International Circuit, to name a few, were all driven by passion—the passion to realise their dreams. They all built successful teams and created enduring brands. Further, the founders of the companies all had one more thing in common—they had graduated from BITS Pilani. These BITS alumni and many more have been successful entrepreneurs and trailblazers in varied fields. How did they do it? Did they score a bullseye the first time? If not, did they experience frustration—like many of us? How did they balance their work and personal lives? Did they have a success mantra? The book provides answers to these questions by taking the reader through the journeys of fifty individuals who realised their dreams through perseverance and determination, be it as entrepreneurs, technologists, scientists, teachers or artists. What is noteworthy is that all of them unanimously attribute their success to the exposure they received in BITS Pilani, highlighting the importance of educational institutes in shaping students' lives.

This book is an initiative of BITS Alumni Association, Hyderabad, to commemorate the golden jubilee of BITS Pilani (1964–2014).

2014	208 pp.	Paperback
978-81-7371-915-8		₹ 350.00

Concise History of Science in India, A (Second Edition)

D M Bose (Ed.)

Former Director, Bose Institute, Kolkata, India

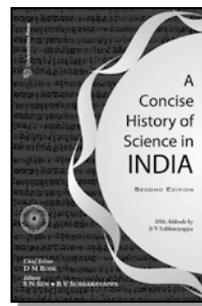
S N Sen (Ed.)

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*

www.universitiespress.com

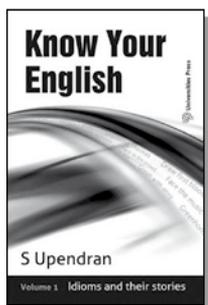
new material. This revised edition, taken up by B V Subbarayappa, one of the three original editors, seeks to integrate the new information with the knowledge already at hand.

2009 980 pp. Paperback
978-81-7371-619-5 ₹ 1,250.00

Know Your English Volume 1: Idioms and their stories

S Upendran

Professor, Department of Materials Development, Testing and Evaluation, English and Foreign Languages University, Hyderabad, India



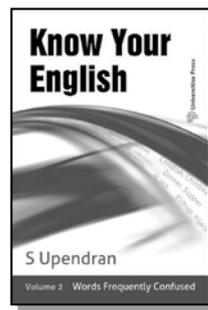
Idioms and their stories is the first of a four volume series, based on the popular column, *Know Your English*, which has been a regular feature in *The Hindu* since 1982. *Teachers, students, and those who are keen on honing their speaking and writing skills will find the series useful.* This volume contains a selection of more than 300 idioms, and each entry gives the meaning of the idiom, provides examples of its use, and wherever possible, traces its origin.

2011 216 pp. Paperback
978-81-7371-729-1 ₹ 250.00

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



Words Frequently Confused, the second volume in the four volume series, *Know Your English*, is based on S. Upendran's popular weekly column 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.

2012 416 pp. Paperback
978-81-7371-730-7 ₹ 425.00

Know Your English, Volume 3

• FORTHCOMING

S Upendran

Should 'history sheeters' be put in jail for 'Eve teasing'? If I'm 'pushing 60', should I 'put in my papers'? Is it 'a university' or 'an university'? Do students 'by heart an answer' or do they 'learn an answer by heart'? Is it 'cope up with' or 'cope with'? Are 'top rankers' expected to have a 'good command over' the English language? Does one 'get down' or 'get off' at Nagpur? Is it possible to 'eat someone's head' and 'sit on it' too? How does one 'cut' a joke and give someone a 'nose cut'? These are just a few of the questions that the third volume in the Know Your English series will provide answers to. 'Grammar and Usage' will highlight many of the common errors that we Indians make when we speak or write in English. Every entry will provide a simple, but detailed explanation of the mistakes we make. Anyone who is 16 years of age or older will find the book useful.

**Know Your English,
Volume 4**

• FORTHCOMING

S Upendran

The fourth and final volume of this very popular series deals with vocabulary and pronunciation. In particular, the meaning and pronunciation of individual words and everyday expressions, commonly used in India. In addition, numerous examples and the etymology of words have also been provided.

Science and Life (English)

A committee for Science and Life from the Delhi University has collectively authored the book.

Suman Dudeja, Aranya Bhattacharjee, J M Khurana, Binay Kumar, V K Ahluwalia, Rakesh Malik, Sushil Kumar, R K Gupta, Kulvinder Singh, J P Khurana (Convener)



Science and Life aims to build appreciation for science, develop the scientific temper and help the student understand where and how science is linked to daily life. The goal is to build on the high school experiences of students rather than simply encourage them to memorise more technical details. By studying this book, the student should:

- understand how science has brought about many changes in our daily lives,
- know how science helps in assessing energy requirements,
- learn how to analyse and interpret data,
- learn problem-solving skills, and
- appreciate interdisciplinary connections and associate them with emerging new directions.

The bottomline is to lay a common integrative foundation for all students to enable them to

view scientific issues from multiple perspectives and make better-informed decisions of societal relevance.

Contents: **Unit I: Origin and Evolution of Life** ♦ **Origin and Evolution of Life** ♦ Origin of universe, Timeline of the Big Bang, Formation of the solar system and the origin of the earth, Origin of life on earth, Why is earth unique in the solar system when compared to other planets? Prebiotic chemistry, Why is water necessary for life?, Importance of carbon, The early atmosphere, Distribution of life in the universe. ♦ **Unit II: Water and Energy for Life** ♦ **Water** ♦ Hard and soft water, Water softening techniques, Potable and non-potable water, Desalination, Electrodialysis, Commonly used water purification techniques, Reverse osmosis, Filtration, Distillation, Heating, Purification of sewage water, Water resources, Water conservation, Agricultural use, Industrial uses, Domestic use, Use of wastewater, Rain water harvesting. ♦ **Energy** ♦ Different forms of energy, Mechanical energy, Chemical energy, Electrochemical energy, Electric energy, Thermal energy (heat energy), Electromagnetic energy, Energy resources, Non-renewable energy sources, Renewable energy sources, Conservation of energy. ♦ **Unit III: Nutrients and Household Chemicals** ♦ **Nutrients** ♦ Macronutrients, Why are carbohydrates essential?, Why are proteins essential?, Why do we need fat to survive?, Micronutrients, Nutritive value of foods, Nutritive value of Indian foods, Nutritive value of processed foods, Balanced diet and Indian food pyramid, Recommended dietary allowance for Indians, Obesity and BMI, Fermentation technology in food science, Fermentation process, Common fermented food products, Fermented dairy products, Fermented non-dairy products, Probiotics. ♦ **Household Chemicals** ♦ Common household chemicals, Table salt, Acids and bases around us, Antiseptics and disinfectants, Bleaching and stain removal, Rusting (corrosion), Fire extinguishers. ♦ **Unit IV: Physical Parameters and Household Appliances** ♦ **Physical Parameters** ♦ Distance, Important events at different 'scales' of distance, Units, Prefix as a multiple of unit, Scale on a drawing, Techniques for measurement of distance, Mass, Use of the term 'mass' in science, Time, Unit and measurement of time, Temperature, Measurement of temperature, Difference between heat and temperature, Variation of temperature on earth, Transfer of heat, Force, Units of force (newton, N), Four fundamental forces. ♦ **Household Appliances** ♦ Refrigerator, Earthen pot water evaporation coolers, Pumps, Resistive heater, Disposal of electrical/electronic devices, Harmful effects, e-waste treatment and

www.universitiespress.com

disposal methods, Existing legislation (India), Rating of gadgets. ♦ **Unit V: Industry and Technology in Daily Life ♦ Contributions of Polymer Industry** ♦ Types of polymers, Plastics, Disadvantages of plastics, Rubber and tyres, Textile and clothing, Ceramics, Whiteware. ♦ **Pharmaceuticals and Cosmetics** ♦ Commonly used drugs in daily life, Antipyretics, Analgesics, Antibiotics, Antiseptics, Generic drugs, Herbal medicines, Drug abuse, Cosmetics, Constituents of cosmetics, Some popular types of cosmetics and their constituents. ♦ **Agrochemicals** ♦ Crop protectors, Pesticides, Soil supplements, Fertilisers, Hormones/growth agents, Environmental impact of pesticides/insecticides/fungicides/ herbicides, Air pollution, Water pollution, Soil pollution, Organic farming. ♦ **Electronic Industry and Space Exploration** ♦ General introduction, IC (integrated circuits), Applications, LED (light emitting diode), Concerns about LEDs, Applications, LCD (liquid crystal display), Some facts and fiction, Applications, Solar cell, Some facts and fiction, The government initiative, Applications, Sensors, Applications, Audio-visual, Applications, Laser, Some concerns about lasers, Some facts and fiction, Applications, Space exploration—India's initiative, Applications.

2013 160 pp. Paperback
978-81-7371-901-1 ₹ 112.00

Squaring the Circle: Seven Steps to Indian Renaissance

APJ Abdul Kalam

Former President of India

Arun Tiwari

Adjunct Professor, University of Hyderabad,
Hyderabad, India



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.

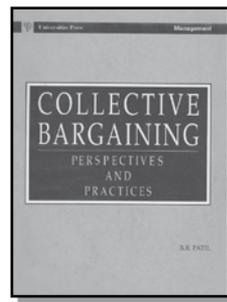
Contents: Prologue ♦ Introduction ♦ Acknowledgements ♦ The Story of Socrates ♦ We Are All One ♦ Truth and Reconciliation ♦ Beyond Narrow Domestic Walls ♦ A World View is a Lens ♦ Ignited Minds ♦ Know Thyself ♦ Social Enterprise ♦ Istikhara ♦ Good to Great ♦ Re-energizing Relations ♦ Strength respects Strength ♦ Work, Bread, Water and Salt for All ♦ Livable Planet ♦ Epilogue ♦ Index

2013 304 pp. Paperback
978-81-7371-891-5 ₹ 325.00

MANAGEMENT

Collective Bargaining

B R Patil



This book outlines the concept of collective bargaining as it has developed in many industrial countries. It does not restrict itself to the development and present status of collective bargaining in the industrialised market economies alone, but analyses its development and practice in Indian industries too.

2014 564 pp. Paperback
978-81-7371-688-1 ₹ 675.00

Consumer Affairs

Sri Ram Khanna

Professor, Faculty of Commerce and Business, Delhi
School of Economics Campus, University of Delhi,
Delhi, India

Savita Hanspal

Reader, Department of Commerce, Kamala Nehru College, University of Delhi, Delhi, India

Sheetal Kapoor

Reader and Teacher-in-charge, Department of Commerce, Kamala Nehru College, Delhi, India

H K Awasthi

Advocate, Former Deputy General Manager (Law), MMTC Ltd., Delhi, India

The consumer movement is a collaborative effort to provide protection to consumers from the unfair dealings of the trade and industry. *Consumer Affairs* articulates important reading and reference material for consumers from every layer of society, thereby empowering people - individually and collectively - to exercise their rights and responsibilities consciously. This book provides comprehensive coverage of consumer concerns which have been recently brought into focus, and which are still evolving. It includes a discussion of:

- Consumer rights and responsibilities
- The Consumer Protection Act, 1986
- The three-tier consumer complaint redressal procedure
- Redressal agencies
- Important cases as examples
- Product quality, standardisation and testing
- Advertising and sales promotion: social, ethical and legal aspects
- The Competition Act, 2002 with the latest amendments
- Sustainable development, green marketing and ethical consumerism

With increasing consumerism in a free-trade economy, there is an urgent need to create consumer awareness at the grassroots level, beginning with the student community. With this end in view, the University of Delhi has introduced an optional paper on consumer awareness for students of B. Com (Hons) and the new B.A. programme. This is the only comprehensive text book that covers the syllabus for this paper. The chapters are well-written and the language is simple and easy to comprehend. This book will also prove useful to consumers, especially those dealing with consumer issues in the government, in

companies, and those pursuing the redressal of consumer complaints.

Contents: *Foreword* ♦ *Introduction* ♦ *UNIT I: Conceptual Framework* ♦ *Consumer Awareness and Problems* ♦ *UNIT II: The Consumer Protection Act, 1986: Objectives and Basic Concepts* ♦ *The Organisational Set Up under the Consumer Protection Act* ♦ *Grievance Redressal Mechanism under the CPA* ♦ *UNIT III: Leading cases decided under the CPA* ♦ *Quality and Standardisation* ♦ *UNIT IV: Social, Ethical and Legal Aspects of Advertising and Sales Promotions* ♦ *Sustainable Consumption and Production* ♦ *Consumer Organisations and their Role in the Consumer Movement* ♦ *UNIT V: Competition Law* ♦ *industry Regulators* ♦ *Annexure A Format for complaint to be filed before the District Forum* ♦ *Annexure B List of Indian standards under mandatory certification under the ISI certification scheme* ♦ *Annexure C Products tested/published by VOICE* ♦ *Annexure D Form of complaint (to be lodged) with the Banking Ombudsman* ♦ *Annexure E address and areas of operation of the Banking Ombudsman*

2007 978-81-7371-581-5	352 pp.	Paperback ₹ 450.00
---------------------------	---------	-----------------------

E-Governance**Ashok Agarwal**

Board of ACS Technologies Ltd; Chairman, Special Interest Group on e-Governance

Today, information and communications technologies are being used by governments to deliver services to citizens at convenient geographical locations. The objective is to make the services more transparent, improve their reach and reduce response time as well as cost. While some of these e-governance projects have been successful, there have been issues with the implementation and sustenance of many other projects. This book is a selection of case studies of a few of the on-going e-governance projects entered for the CSI-Nihilent e-Governance Awards 2005–2006. It is hoped that this compilation will help in sharing valuable information on successful models, evaluation of models and potential implementation issues that need to be addressed in large e-governance projects.

Contents: *Foreword* ♦ *Preface* ♦ *Evaluating E-Government* ♦ *Effective Public Service Delivery*

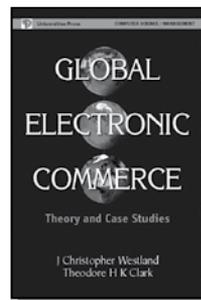
www.universitiespress.com

and E-Governance: Who Drives Whom ♦ E-SAGU: The Next Generation IT-based Query-less, Cost-Effective and Personalized Agro-Advisory System ♦ BHOOMI: Online delivery of Record of Rights, Tenancy and Crops to farmers in Karnataka, India ♦ e-DHARA ♦ KHAJANE: The Comprehensive Online Treasury Computerisation Project ♦ BangaloreOne: Integrated Citizen Service Centre ♦ National Portal of India (<http://india.gov.in>) ♦ PIMS: A Self-Sustaining e-Governance Project in Government ♦ Satellite-Image-Based Water and Land Development Plan ♦ Block Community Portals of Community Information Centres in the North-Eastern States ♦ Centralised Allotment Process (CAPNIC) ♦ Community Information Centres ♦ Computerised Lok Ayukta Information Management System (CLAIMS) ♦ Complaints Registration and Monitoring System (CRAMS) ♦ DC*SUITE ♦ 'Dev-bhoomi'—Land Records Computerisation in Uttaranchal: A G2C and G2G e-Governance Application ♦ Dharitree: The Web-Technology-Based Total Land Records Management System of Government of Assam ♦ e-DISHA – Electronic Delivery of Integrated Services of Haryana to All ♦ e-KOSH: Online Computerisation of Treasuries, Chhattisgarh ♦ e-Post: Department of Posts, Government of India ♦ Implementation of e-procurement in the Government of Andhra Pradesh: A Case Study ♦ e-SAMPARK: A Multi-Service Single Window operations Project ♦ e-SUVIDHA ♦ HALRIS # HARIS Bridge: Dynamic Integration of Property Registration and Land Records Administration in Haryana ♦ ICT solution for NREGA Implemented in Andhra Pradesh ♦ Instant Money Order (iMO) ♦ Mobile Applications in Irrigation Department for Reservoir Level Monitoring ♦ MSEB's Secured e-Tendering Solution ♦ NISANI: National Identity Cards Scheme ♦ Pension Case Status Online ♦ Open-Source Initiatives ♦ Postal Life Insurance ♦ Prioritized Project-Monitoring System (PPMS) ♦ Rojgarwahini: Portal of the Directorate of Employment and Self Employment, Government of Maharashtra ♦ SMART-Move ♦ Spandan – File, Grievance and Press Reports Monitoring System ♦ Service and Payroll Administrative Repository for Kerala (SPARK) ♦ Status Information Management System by NIC: A G2G Application ♦ SWIFT: State-Wide Information on Financial Transactions ♦ Portnet: An e-Governance Project for Rural Masses ♦ Treasury Information Management (TRIM)

2008 452 pp. Paperback
978-81-7371-596-9 ₹ 695.00

Global Electronic Commerce: Theory and Case Studies (MIT Press)

J Christopher Westland & Theodore H K Clark



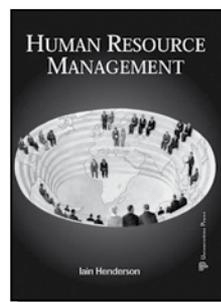
Electronic commerce has spurred far-reaching changes in business, on multiple fronts, using many technologies. This book provides a deep, practical understanding of these technologies and their use in e-commerce. Unlike other books on e-commerce, it does not concentrate solely on the Internet. Instead, it suggests that the Internet is only a bridge technology, attractive because of its low cost and global reach, but unattractive because of its slow speed and poor user interface.

2001 608 pp. Paperback
978-81-7371-394-1 ₹ 775.00

Human Resource Management

Iain Henderson

Senior Teaching Fellow, Edinburgh Business School, Heriot-Watt University, Edinburgh, UK



Human Resource Management is designed for the managers of tomorrow who are increasingly required to undertake aspects of HRM as part of their day-to-day duties. It is an ideal text for MBA students taking a first HRM course

or module and Masters students on general business and management programmes. Comprehensive but extremely accessible, this textbook draws on the latest academic research and provides students with everything they need to know about HR theory and practice. Using case studies and practical examples, it places HR firmly in a managerial context giving students the real-world perspective needed to succeed in people management. In this innovative book, Henderson demonstrates an understanding of busy MBA students' needs and time limitations, avoiding too much emphasis on historical detail and providing plenty of support material, including tutor and student websites.

Contents: People Management: Personnel Management and Human Resource Management ♦ Looking Ahead: HRM and Strategy ♦ Designing Work: Organising Work and People ♦ Managing the Human Resource Flow ♦ Developing People ♦ Employee Relations ♦ Rewarding People ♦ HRM and Competency ♦ Managing Diversity ♦ People Issues in Mergers and Acquisitions ♦ HRM in International Companies ♦ Review

2009 268 pp. Paperback
978-81-7371-650-8 ₹ 475.00

Industrial Psychology

Dipak Kumar Bhattacharyya
Professor, Xavier Institute of Management,
Bhubaneswar, India

Sutapa Bhattacharya
Psychologist, Bhubaneswar, India

It is a comprehensive textbook for engineering and management students. The subject is covered in relation to the specific areas of syllabus as well as emerging thoughts in the field. Industrial Psychology or IP is a scientific study of factors affecting employees or workers. It comprises of work and time study, motivation and leadership. It also encompasses highly critical human resource management functions like recruitment, training and development. The modern challenges of managing diversity, change, technology and innovation can be effectively met only with training in IP. The book covers all these aspects in a lucid manner with a student-friendly approach.

Contents: Introduction to Industrial Psychology ♦ Scientific Management and Industrial Psychology ♦ Work Study ♦ Behavioural Theories and Industrial Psychology ♦ Motivation and Job Satisfaction ♦ Work Environment: Management of Fatigue and Stress ♦ Organizational Culture and Organizational Development ♦ Theories of Leadership ♦ Group Dynamics ♦ Job Analysis and Job Design ♦ Recruitment and Selection ♦ Psychological Testing ♦ Performance Management ♦ Training and Development

2012 300 pp. Paperback
978-81-7371-784-0 ₹ 350.00

International Finance (Second Edition)

G Shailaja

Associate Professor, Osmania University, Hyderabad



It is a textbook for management students and a reference for practicing managers. In this revised edition, all the chapters have been updated. New chapters on global strategic alliances, international taxation, international project management and currency crises have been added. The approach has been to blend theory with practical aspects of decision-making. Latest policy changes in the Indian scenario have been included. Salient features of the book are:

- Learning objectives, keypoints and glossary are provided for each chapter
- Illustrative examples and solved problems will improve the learners' orientation for numerical work
- Self-assessment questions of different types like MCQs, fill in the blanks and descriptive answers
- Interesting case studies that will sharpen analytical skills

www.universitiespress.com

Contents: Introduction to International Finance
 ♦ Financial Markets ♦ Foreign Exchange Market ♦
 Foreign Exchange Quotes ♦ Currency Derivatives
 ♦ Eurocurrency Market ♦ Sources of Finance ♦
 International Financing Agencies ♦ Theories of
 Exchange Rates ♦ Currency Convertibility ♦ Evolution
 of the International Financial System ♦ Balance of
 Payments ♦ Types of Foreign Exchange Exposure
 ♦ Hedging Currency Risk ♦ Capital Budgeting for
 Overseas Investment ♦ Cross-border Mergers and
 Acquisitions ♦ International Portfolio Investment ♦
 Documentation in International Trade ♦ Financing
 of International Trade ♦ International Accounting
 ♦ Transfer Pricing ♦ Multinational Tax Planning ♦
 International Banking ♦ Multinational Corporations
 and Corporate Governance ♦ Financial Crises

2011 528 pp. Paperback
 978-81-7371-747-5 ₹ 450.00

International Human Resource Management

Chris Brewster

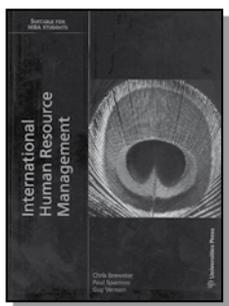
Professor, International HRM, Henley Management
 College, UK

Paul Sparrow

Director, Centre for Performance-Led HR
 Professor, International HRM, Lancaster University
 Management School, UK

Guy Vernon

Lecturer, Human Resource Management, Southampton
 University, UK



This new and substantially revised second edition of *International Human Resource Management* explores both comparative and international HRM, discussing leading practices and the controversies that surround them. Developed from the authors' extensive experience in the field, it presents a comprehensive

treatment of the subject from a truly global perspective, including material from the Pacific Rim, China and India. Chapters are grounded in academic research and include case studies, activities and a range of other feature to test and reinforce students' understanding.

"This excellent book will prove to be most valuable for postgraduate and undergraduate HRM students. It is very comprehensive in compass and coverage while being interesting and fluently written by a group of internationally renowned scholars."

Professor Michael Poole Cardiff Business School, UK, and editor of the International Journal of Human Resource Management

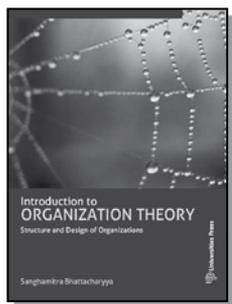
Contents: *List of Tables ♦ List of Figures ♦ Acknowledgements* ♦ International Human Resource Management: An Introduction ♦ PART ONE: NATIONAL CULTURES: The Impact of National Culture ♦ Culture and Organisational Life ♦ PART TWO: COMPARATIVE HRM: Comparative HRM: Theory and Practice ♦ Comparative HRM: The Role of the HR Department ♦ Comparative HRM: Recruitment and Selection ♦ Comparative HRM: Reward ♦ Comparative HRM: Training and Development ♦ Comparative HRM: Flexibility and Work–Life Balance ♦ Comparative HRM: Employee Relations and Communications ♦ PART THREE: INTERNATIONAL HRM: International HRM: Theory and Practice ♦ Managing International Working ♦ Managing Diversity in International Working ♦ PART FOUR: NEW DEVELOPMENTS AND THE ROLE OF THE HR FUNCTION: New Developments in International HRM ♦ Managing International HRM ♦ *Index*

2008 344 pp. Paperback
 978-81-7371-615-7 ₹ 495.00

Introduction to Organization Theory

Sanghamitra Bhattacharyya

Feedback Foundation



Introduction to Organization Theory is a textbook for students and scholars of business management, aspiring to be practicing managers in the corporate world. It introduces them to 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.

Contents: Chapter 1: Understanding Organizations Organizational Insight ♦ Chapter 2: Organizational Effectiveness Organizational Insight ♦ Chapter 3: Organization Structure Organizational Insight ♦ Chapter 4: Organizational Strategy Organizational Insight ♦ Chapter 5: Organizational Environment Organizational Insight ♦ Chapter 6: Technology in Organizations Organizational Insight ♦ Chapter 7: Organizational Culture Organizational Insight ♦ Chapter 8: Organizational Failure Organizational Insight ♦ Chapter 9: Managing Organizational Change Organizational Insight ♦ *Chapter Summary Review Questions ♦ Project Assignment Case Illustration: Downsizing in a manufacturing organization Critical enquiry ♦ References ♦ Index*

2011

208 pp.

Paperback

978-81-7371-737-6

₹ 275.00

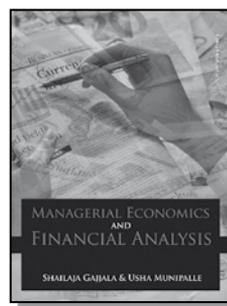
Managerial Economics and Financial Analysis

Shailaja Gajjala

Professor, Department of Business Management,
Osmania University, Hyderabad

Usha Munipalle

Professor, Department of Commerce, Osmania
University, Hyderabad



Economics is the simple logic we apply for making decisions every day, be they purchases or investments. However, any concept or theory can be made complicated by the use of unnecessary jargon. *Managerial Economics and Financial Analysis* aims to cut through this barrier and present information in a logical and straightforward manner.

This book covers three important areas in the field of Finance: Managerial Economics, Financial Accounting and Financial Management. Designed to meet the undergraduate course requirements of engineering students, this book aims to present the main concepts and theories in a simple and lucid style. It includes many worked out examples and problems and provides interesting snippets of information relating to the current scenario in India.

Salient features:

- ♦ Central points presented in easy-to-remember bullet form
- ♦ Worked out examples progress from simple to complex
- ♦ Line drawings included to enhance understanding and for quick reference
- ♦ Key terms defined at the end of every chapter
- ♦ Comprehensive practice questions and assignments (with answers) provided for every chapter
- ♦ Neat, clutter-free layout to improve readability

www.universitiespress.com

Contents: Introduction to Managerial Economics
 ♦ Demand Analysis ♦ Demand Elasticity ♦ Demand Forecasting ♦ Production Analysis ♦ Cost Analysis
 ♦ Introduction to Markets and Managerial Theories of the Firm ♦ Pricing Policies and Practices ♦ Types of Business Organizations ♦ Financial Accounting ♦ Accounting Concepts and Recording of Transactions
 ♦ Ledger and Trial Balance ♦ Final Accounts ♦ Ratio Analysis ♦ Funds Flow Statement ♦ Capital Budgeting ♦ Sources of Finance ♦ *Appendix I* ♦ *Appendix II* ♦ *Answer Key* ♦ *Index*

2012 376 pp. Paperback
 978-81-7371-774-1 ₹ 350.00

Marketing Research

Debashis Pati



Marketing and sales is all about 'logical' decision making and implementation. And Marketing Research is the aid to analyze, know, evaluate, and decide. It is an essential link between the marketer and the marketplace, and a basic part of any marketing and sales process. Marketing and sales without marketing research is 'gut feeling' and this is best avoided in order to succeed. This book attempts to blend marketing research into marketing and sales. The author wishes to create an ideal perspective for market research among marketers, advertisers, sales professionals, consultants and, above all, market researchers. It is a necessary textbook for all management students, a handy reference for marketing managers, a useful guide for professionals in market research and advertising agencies, and an essential tool for management trainers.

2002 720 pp. Paperback
 978-81-7371-415-3 ₹ 725.00

Production and Operations Management: Theory and Practice

Dipak Kumar Bhattacharyya

Professor, Xavier Institute of Management,
 Bhubaneswar



Production and Operations Management is a core subject for MBA students; it is compulsory reading for them. This book conforms to the syllabus requirements of most national and international MBA/PGDBM programmes.

Special features:

- ♦ It is written in lucid language
- ♦ There is limited use of technical jargon
- ♦ Case studies have been added
- ♦ Explanation of theory with practices from industry given as examples
- ♦ Numerical examples have been included
- ♦ Discussion of contemporary areas have been added
- ♦ Adequate examples and illustrations have been provided
- ♦ General and Critical Review Questions have been appended at the end of each chapter. Emerging areas discussed include: Ethical Issues in Production and Operations, Six Sigma Practices, Production and Operations Management Research, and International Production and Operations Management.

Contents: Chapter 1: Introduction to Production and Operations Management ♦ Introduction ♦ Definition and Concepts ♦ Differences between Manufacturing and Services ♦ Historical Process of Development of POM Functions ♦ Models for Production/Operations Systems ♦ The Role of the Operations Manager ♦ Manufacturing Plant ♦ Recent Trends in Production and Operations Management Functions ♦ Production and Operations Strategy
 ♦ Chapter 2: Production Planning and Control ♦ Introduction ♦ Definition and Concepts ♦ Steps in

Production Planning ♦ Aggregate Planning ♦ Capacity and Material Requirement Planning ♦ Materials Requirement Planning ♦ Manufacturing Resource Planning (MRP-II) ♦ Forecasting ♦ Decision Making ♦ Management Information Systems and Decision Support Systems ♦ Scenario Planning for Production and Operations Management ♦ Limitations of Planning ♦ Production-related Forms ♦ Chapter 3: New Product Planning and Development ♦ Introduction ♦ Steps for New Product Development ♦ New Service Development Design ♦ New Product Development or Selection Process ♦ Product/Service Life Cycle Analysis ♦ Process Selection ♦ Chapter 4: Facilities Planning, Layout and Location Analysis ♦ Plant Layout ♦ Determinants of Layout ♦ Types of Layout ♦ Flowcharting ♦ Some more Layouts ♦ Analysis and Selection of Layouts ♦ Steps involved in Facilities Planning ♦ Tools for Facilities Planning ♦ Plant Location ♦ Location Analysis ♦ Chapter 5: Scheduling and Sequencing of Production ♦ Introduction ♦ Components of Production Scheduling ♦ History of Production Scheduling ♦ Scheduling of Service Operations ♦ Tools and Techniques for Scheduling ♦ Sequencing ♦ Johnson's Rule for Scheduling ♦ Gantt Charts ♦ More Scheduling Tools and Techniques ♦ Queuing Theory ♦ Chapter 6: Work Study and Work Measurement ♦ Introduction ♦ Job information ♦ Job Analysis ♦ Methods of Analysis ♦ Work Study ♦ Method Study ♦ Work Measurement ♦ Time Study ♦ Other Techniques of Work Measurement ♦ Concept and Definition of Ergonomics ♦ Value Analysis ♦ Work Sampling ♦ Work Simplification ♦ Chapter 7: Network Analysis and Project Management ♦ Introduction ♦ Different Forms of Network Analysis ♦ Benefits of Network Analysis ♦ Defects of Network Analysis ♦ Definition and Concept of Float ♦ PERT/CPM Networks ♦ Network Diagram Symbols ♦ Programme Evaluation and Review Technique (PERT) ♦ Critical Path Calculation ♦ Crashing of a Project ♦ Free and Independent Float ♦ Definition of a Project ♦ Project Life Cycle ♦ Project Management ♦ Duties and Responsibilities of a Project Manager ♦ Chapter 8: Maintenance Management ♦ Introduction ♦ Different Types of Maintenance ♦ Total Productive Maintenance (TPM) and Overall Equipment Effectiveness (OEE) ♦ TPM and TQM ♦ Maintenance Management Systems and Strategies ♦ Organization and Functions of Maintenance ♦ Elements of Effective Maintenance Management ♦ Best Practice Maintenance Management ♦ Models of Maintenance Organization Structure ♦ Roles and Responsibilities of Maintenance Managers ♦ Need for Maintenance

Policy ♦ Spare Parts Planning and Control In Maintenance ♦ Simulation ♦ Replacement Theory ♦ Lean Maintenance System ♦ Chapter 9: Quality Management Practices ♦ Introduction ♦ Importance of Quality in an Organization ♦ Quality to Quality Management ♦ Definition of Quality Management Principles ♦ ISO Standards ♦ Quality Gurus and their Contribution to TQM Practices ♦ Teams and Teamwork ♦ Employee Empowerment ♦ Quality of Work-life (QWL) ♦ Six Sigma Practices ♦ Innovation and Creativity ♦ Quality Circles and Total Employee Involvement ♦ Quality Function Deployment (QFD) ♦ Statistical Process Control (SPC) ♦ Data Collection ♦ Chapter 10: Six Sigma in Production and Operations Management ♦ Introduction ♦ Definitions and Concepts ♦ Introduction of Six Sigma in Organizations ♦ Steps for Implementation ♦ Calculating Sigma level Quality ♦ Six Sigma and Organizational Culture ♦ Six Sigma and Quick Response Manufacturing (QRM) ♦ Six Sigma and Lean Practices ♦ Six Sigma through Strategic HR Practices ♦ Chapter 11: BPR, TQM, Cross-cultural Aspects and Models of Excellence ♦ Introduction ♦ Business Process Reengineering – Concepts and Definitions ♦ Impact of BPR on Organizations ♦ TQM and the Culture of Quality ♦ Cross-cultural Influence and Technology ♦ Proactive Technological Culture for POM ♦ Best Practice Models for Excellence in POM functions ♦ Organizational Change through Six Sigma ♦ Six Sigma: Introduction in Organizations ♦ Lean Practices to Achieve Organizational Excellence ♦ Quick Response Manufacturing (QRM) ♦ Toyota Production System (TPS) ♦ Chapter 12: Human Resources Management, Strategic Dimensions and POM ♦ Introduction ♦ History of HRM ♦ Definitions and Concepts of HRM ♦ HRM and Strategy ♦ HR Strategy Factors ♦ Different Schools of Thought and HRM ♦ Human Resource Management as a Process ♦ HRM as a System ♦ Human Resource Management Techniques ♦ HRM Functions ♦ Roles, duties and responsibilities of a Human Resource Manager ♦ HR Manager's Role: Clarifications ♦ HR Organizational Structure ♦ Human Resource Development (HRD) Concepts ♦ Chapter 13: Productivity, Incentives and POM ♦ Introduction ♦ Definition of Productivity ♦ Key Drivers or the Determinants of Productivity Growth ♦ Factors to improve Productivity ♦ Common Misconceptions about Productivity ♦ Productivity Measurement ♦ Productivity Measurements – Ratio Problem ♦ Productivity and Quality ♦ Role of Trade Unions in Productivity Improvement ♦ Productivity-linked Incentive Determination ♦ Economic Value

www.universitiespress.com

Added (EVA) ♦ Organizational Sickness and Productivity ♦ Chapter 14: Materials Management and Inventory Control ♦ Introduction ♦ Definition and Concepts of Materials Management ♦ Selective Inventory Control ♦ Selective Inventory Control through Various Techniques ♦ Economic Ordering Quantity ♦ Supply Chain Management and Inventory Control ♦ Chapter 15: Supply Chain Management ♦ Introduction ♦ Definitions and Concepts ♦ Process of SCM ♦ Selection of Channel Strategy ♦ Core Operations Capabilities ♦ SCM Decisions ♦ SCM Models ♦ Chapter 16: Ethics, Corporate Social Responsibility and Environment Management in Production and Operations Management ♦ Introduction ♦ Definition and Concepts ♦ The Code of Ethics in Manufacturing ♦ Environmental Issues in Production and Operations ♦ Pollution Concepts and Definition ♦ Environment Management and ISO Standards ♦ Corporate Social Responsibility and Environmental Issues ♦ Workplace Environment ♦ Fatigue at the Workplace ♦ Legal Provisions for Occupational Health and Safety ♦ Managing Stress in Organizations ♦ Chapter 17: Production and Operations Management Research ♦ Introduction ♦ Different Approaches to POM Research ♦ Linear Programming (LP) ♦ Network Analysis ♦ Transportation and Assignment Techniques ♦ Game Theory ♦ Chapter 18; International Production and Operations Management ♦ Introduction ♦ Impact of Globalization ♦ Advantages and Disadvantages of the Internationalization of POM ♦ International POM Strategy ♦ Network Strategy of International POM ♦ Outsourcing ♦ *Index*

2012 616 pp. Paperback
978-81-7371-776-5 ₹ 550.00

Research Methodology

NEW

Ratan Khasnabis

Retired Professor, Department of Business Management, University of Calcutta

Suvasis Saha

Professor, Department of Business Management, University of Calcutta



Research Methodology addresses empirical research issues with a focus on research design, the problems involved in constructing an appropriate research design and the means to overcome these problems. Data, its sources, methods employed to obtain data, experimental techniques employed, types of errors that may creep in, how to measure, check and control errors are all addressed. Once the data is collected, methods to analyse the data, present them as a cogent report and the limitations of research are dealt with. A detailed case study illustrates all the concepts explained in the book and the chapter-wise assignments will definitely help the student to understand the basic issues of market research. The book is primarily intended to serve as a textbook for the students of Management at the undergraduate and postgraduate levels.

Contents: Introduction ♦ Research Design ♦ Sources of Data ♦ Maintaining Data Quality Under Various Settings ♦ Experimental Techniques ♦ The Questionnaire Method ♦ Errors in Data: Measurement Error ♦ Measurement and Scaling Techniques ♦ Methods of Data Collection ♦ Tools of Processing and Analysis of Data ♦ Sampling, Sampling Errors and Testing of Hypotheses ♦ Data, Analysis and Report Writing ♦ Research Administration ♦ An Illustration of Research Methodology ♦ *Appendices* ♦ *Index*

2015 320 pp. Paperback
978 81 7371 952 3 ₹ 295.00

Research Methods in Human Resource Management

Valerie Anderson

Principal lecturer, HRM, Portsmouth Business School, UK



This book addresses the needs of HRM and CIPD students writing a management report or dissertation, providing both theoretical frameworks and practical guidance. Providing an accessible guide to the planning and execution of HRM research projects, this text seeks to

develop the knowledge and skills of first-time researchers for effective research into HRM issues in organisations.

Contents: The nature of research in HR, and how to use this book ♦ First stages in the HR project ♦ Ethics and HR research ♦ Reviewing and evaluating existing knowledge ♦ Approaches to gathering data in HR research ♦ Finding and using documentary and organisational evidence ♦ Collecting and recording qualitative data ♦ Analysing qualitative data ♦ Collecting and recording quantitative data ♦ Analysing quantitative data and formulating conclusions ♦ Communicating your research ♦ Final reflections

2011	385 pp.	Paperback
978-81-7371-733-8		₹ 595.00



978-81-7371-797-0	Adolescence	Usha R Krishna & Vinita Salvi
978-81-7371-785-7	Advances In Cloud Computing	Anirban Basu, Rajiv Ranjan & Rajkumar Buyya (Eds)
978-81-7371-841-0	Advances in Medical Plants	Janardhan K Reddy
978-81-7371-925-7	Agenda of the Apprentice Scientist	Nicole Ostrowsky
978-81-7371-837-3	Amphibians of Peninsular India	R J Ranjit Daniels
978-81-7371-932-5	Ananthanarayanan & Paniker's Textbook of Microbiology (Ninth Edition)	Arti Kapil (Ed.)
978-81-7371-883-0	Antenatal and Intrapartum Surveillance	Sir Sabaratnam Arulkumaran, Jaydeep Tank, Rohana Haththoutuwa & Parikshit Tank (Eds)
978-81-7371-970-7	Arithmetic and Algebra: Numbers and the Beginnings of Algebra	Shailesh A Shirali
978-81-7371-765-9	Arithmetic and Algebra: The Challenge and Thrill	Shailesh A Shirali
978-81-7371-869-4	Astrophysics of the Solar System	K D Abhyankar
978-81-7371-871-7	Astrophysics: Stars and Galaxies	K D Abhyankar
978-81-7371-898-4	At the Speed of Light (V.I.P.)	G Venkataraman
978-81-7371-896-0	Benign Breast Diseases: A Surgical Approach	Uma Krishnaswamy
978-81-7371-859-5	Bhabha and his Magnificent Obsessions	G Venkataraman
978-81-7371-868-7	Birds Beyond Watching	Abdul Jamil Urfi
978-81-7371-894-6	Birds in our Lives	Ashish Kothari
978-81-7371-852-6	Bose and his Statistics	G Venkataraman
978-81-7371-807-6	Brief History of Rocketry, A	P V Manoranjan Rao & P Radhakrishnan
978-81-7371-833-5	Butterflies of Peninsular India	Krushnamegh Kunte
978-81-7371-863-2	Can Stars Find Peace	G Srinivasan
978-81-7371-906-6	Cardiology for MRCP: A Socratic Approach	Wong & Chong
978-81-7371-949-3	Cell Biology	Channarayappa
978-81-7371-875-5	Chandrasekhar and his Limits	G Venkataraman
978-81-7371-813-7	Compendium of E-governance	Piyush Gupta
978-81-7371-836-6	Computer, Internet and Multimedia Dictionary	Surendra Verma
978-81-7371-964-6	Concepts in Biotechnology (Second Edition)	D Balasubramanian, C F A Bryce, K Dharmalingam, J Green & Kunthala Jayaraman (Eds)
978-81-7371-895-3	Controversial Drug Plants	Vasudevan Nair
978-81-7371-966-0	Cultivation of Spice Crops	A A Farooqi, B S Sreeramu & K N Srinivasappa
978-81-7371-853-3	Data Mining Techniques	Arun K Pujari
978-81-7371-968-4	Digital Communications and Signal Processing (Second Edition)	K Vasudevan

978-81-7371-808-3	Dimensions of Environmental and Ecological Economics	Amita Kumari Choudhury & Nirmal Chandra Sahu (Eds)
978-81-7371-866-3	Disaster Management	Harsh K Gupta
978-81-7371-865-6	Disaster Management: Global Challenges and Local Solutions	Rajib Shaw & R R Krishnamurthy
978-81-7371-817-5	Elements of Psychology and Mental Hygiene	Aruna Balachandra
978-81-7371-976-9	Encyclopedia of Classical Indian Sciences	Helaine Selin & Roddam Narasimha
978-81-7371-800-7	Endometriosis	N D Motashaw
978-81-7371-963-9	Engineering Geology	Vasudevan Kanithi
978-81-7371-867-0	Environmental Science and Engineering (Second Edition)	Aloka Debi
978-81-7371-950-9	Experimental Pharmacology (Second Edition)	M C Prabhakar
978-81-7371-987-5	Evolution of Scientific Medicine	P Kutumbiah
978-81-7371-851-9	Field Days	A J T Johnsingh
978-81-7371-846-5	Forensic Medicine	P V Guharaj & M R Chandran
978-81-7371-908-0	General Surgery for Dental Students	Sukumar A
978-81-7371-893-9	Group Theory: Selected Problems	B Sury
978-81-7371-799-4	Gynecological Urology	Usha B Saraiya
978-81-7371-849-6	Hot Story, A	G Venkataraman
978-81-7371-792-5	Indian Medicinal Plants Volume - 1	P K Warriar, V P K Nambiar & C Ramankutty
978-81-7371-793-2	Indian Medicinal Plants Volume - 2	P K Warriar, V P K Nambiar & C Ramankutty
978-81-7371-794-9	Indian Medicinal Plants Volume - 3	P K Warriar, V P K Nambiar & C Ramankutty
978-81-7371-795-6	Indian Medicinal Plants Volume - 4	P K Warriar, V P K Nambiar & C Ramankutty
978-81-7371-796-3	Indian Medicinal Plants Volume - 5	P K Warriar, V P K Nambiar & C Ramankutty
978-81-7371-819-9	International Finance	G Shailaja
978-81-7371-861-8	Introduction to Ayurveda, An	M S Valiathan
978-81-7371-992-9	Introduction to Mechanics (Second Edition)	Mahendra Verma
978-81-7371-848-9	Introduction to Soil Reinforcement and Geosynthetics	G L Sivakumar Babu
978-81-7371-802-1	Low Birth Weight Baby, The	R L Tambyraja
978-81-7371-814-4	Mammals of South Asia: Volume 1	A J T Johnsingh & Nima Manjrekar (Eds)
978-81-7371-955-4	Mammals of South Asia: Volume 2	A J T Johnsingh & Nima Manjrekar (Eds)
978-81-7371-873-1	Management of Labour, The (Third Edition)	Sir Sabaratnam Arulkumaran, Gita Arjun & Leonie Penna
978-81-7371-845-8	Manual of Tropical Housing and Building	O H Koenigsberger, T G Ingersoll, Alan Mayhew & S V Szokolay
978-81-7371-878-6	Many Phases of Matter, The	G Venkataraman
978-81-7371-831-1	Marine Mammals of India	Kumaran Sathasivam
978-81-7371-905-9	Medicine at a Glance	Vasan & Sudha
978-81-7371-806-9	Menopause	Usha R Krishna & Duru Shah
978-81-7371-816-8	Mudaliar and Menon's Clinical Obstetrics	Sarala Gopalan & Vanita Jain
978-81-7371-983-7	Number Theory	Shailesh Shirali & C S Yogananda
978-81-7371-907-3	Obstetrics Medicine	Ogip
978-81-7371-995-0	Operating Systems	Ashok Kumar Sharma

978-81-7371-962-2	Pavement Evaluation and Maintenance Management System	R Srinivasa Kumar
978-81-7371-918-9	Pediatric Endocrine Disorders (Third Edition)	Meena P Desai, P S N Menon & Vijayalakshmi Bhatia
978-81-7371-801-4	Perinatal Asphyxia	S Arulkumar
978-81-7371-974-5	Plant Biotechnology: Methods in Tissue Culture and Gene Transfer	R Keshavachandran & K V Peter (Eds)
978-81-7371-973-8	Powder Metallurgy: Science, Technology and Materials	Anish Upadhyaya & G S Upadhyaya
978-81-7371-975-2	Practical Biotechnology: Methods and Protocols	S Janarthanan & S Vincent
978-81-7371-911-0	Practical Guide to Obstetrics, A: Cost-effective, Evidence-based and Safe Care	Gita Arjun, Lakshmi Seshadri & Uma Ram (Eds)
978-81-7371-804-5	Practical Infertility Management	Duru Shah
978-81-7371-805-2	Practical Neonatal Care	Lalitha Krishnan
978-81-7371-798-7	Pregnancy Induced Hypertension	Harshalal R Seneviratne
978-81-7371-969-1	Primer on Logarithms, A	Shailesh A Shirali
978-81-7371-967-7	Primer on Number Sequences, A	Shailesh A Shirali
978-81-7371-972-1	Probability and Statistics for Science and Engineering	G Shanker Rao
978-81-7371-857-1	Quantum Revolution I: The Breakthrough	G Venkataraman
978-81-7371-876-2	Quantum Revolution II: QED: The Jewel of Physics	G Venkataraman
978-81-7371-899-1	Raman and his Effect (V.I.P)	G Venkataraman
978-81-7371-834-2	Remote Sensing and Its Applications	L R A Narayana
978-81-7371-860-1	Saha and his Formula	G Venkataraman
978-81-7371-847-2	Science 366: A Chronicle of Science & Technology	Birman Basu
978-81-7371-842-7	Solid State Microelectronic and Optoelectronic Devices	Angsuman Sarkar
978-81-7371-812-0	Spiders of India	P A Sebastian
978-81-7371-910-3	Squaring the Circle	A P J Abdul Kalam & Arun Tiwari
978-81-7371-843-4	Statistical Mechanics: An Elementary Outline (Revised Edition)	Avijit Lahiri
978-81-7371-835-9	Story of our Food, The	K T Achaya
978-81-7371-882-3	Textbook of Basic and Clinical Immunology	Sudha Gangal & Shubhangi Sontakke
978-81-7371-815-1	Textbook of Clinical Pharmacy Practice (Second Edition)	G Parthasarathi, Karin Nyfort-Hansen & Milap C Nahata
978-81-7371-965-3	Textbook of Highway Engineering	R Srinivasa Kumar
978-81-250-5034-6	Textbook of Medical Parasitology (Second Edition)	R Panjarathinam
978-81-7371-809-0	Textbook of Medicine	R S Vasani
978-81-7371-838-0	Textbook of Pharmacognosy	Ramachandran
978-81-7371-856-4	Textbook of Surveying	C Venkatramiah
978-81-7371-870-0	Textbook on Heat Transfer, A (Fourth Edition)	S P Sukhatme
978-81-7371-879-3	The Big and the Small Vol: 1	G Venkataraman
978-81-7371-850-2	The Big and the Small Vol: 2	G Venkataraman
978-81-7371-854-0	The Legacy of Caraka	M S Valiathan
978-81-7371-855-7	The Legacy of Vagbhata	M S Valiathan

978-81-7371-840-3	Thermal Imaging Technology: Design and Applications	R N Singh
978-81-7371-844-1	What are the Stars	G Srinivasan
978-81-7371-858-8	What Is Reality?	G Venkataraman
978-81-7371-877-9	Why are Things the Way they Are?	G Venkataraman
978-93-86235-03-9	Wings of Fire: An Autobiography	A P J Abdul Kalam
978-81-7371-780-2	Wings of Fire: An Autobiography	A P J Abdul Kalam & Arun Tiwari

AUTHOR INDEX

- Abhyankar, Shreeram S 13
Abraham, Ralph 91
Abramovich, Y A 103
Adam, John A 85
Adams, Colin C 77
Adams, William W 14
Agarwal, Ashok 134
Ahluwalia, V K 132
Aigner, Martin 66
Alevras, Dimitris 102
Aliprantis, C D 103
Anderson, Valerie 141
Andreescu, Titu 110, 121
Anuradha, H R 32
Apostol, Tom M 93
Artin, Emil 15
Awasthi, H K 134
Axler, Sheldon 8
Barker, Philip 124
Bartle, Robert G 89
Basu, Biman 124
Bean, Michael A 106
Belshoff, Richard 12
Berberian, Sterling K 87
Berkolaiko, Gregory 112
Berndt, Bruce C 94
Bertsekas, Dimitri P 101
Bhargava, Harsh 129
Bhattacharya, Sutapa 136
Bhattacharyya, Dipak Kumar 135, 139
Bhattacharyya, Sanghamitra 137
Bhattacharjee, Aranya 132
Birkhoff, Garrett 3
Bohun, C Sean 84
Boju, Valentin 110
Boos, Lynette 12
Bose, D M 130
Bressan, Alberto 60
Bressoud, David M 33
Brewster, Chris 137
Browder, Andrew 23
Brown III, Leonard L 112
Brown, Arlen 21
Brown, Ryan 12
Chatterjee, S 125
Chebotarevsky, B D 10
Cheney, Ward 99
Cheney, Ward 31
Chow, Bennett 50
Clark, David M 70
Clark, Theodore H K 135
Conway, John B 18, 58
D'Angelo, John P 36
Dass, Tulsı 114
Datta, N 98
De Koninck, Jean-Marie 29, 91
Dedekind, Richard 27
Deo, Sadashiv G 65
Deshmukh, Shailaja R 116
Dey, A 66
Dineen, Seán 83
Djukic', Dusan 64
Doob, J L 88
Dorichenko, Sergey 111
Dubrovin, B A 73, 74
Dudeja, Suman 132
Duoandikoetxea, Javier 56
Duren, Peter 22
Duzhin, S V 10
Dym, Harry 78
Edelsbrunner, Herbert 118
Eidelman, Yuli 59
Elman, Richard 10
Etingof, Pavel 7
Evans, Lawrence C 46
Feng, Zuming 121
Fiestras-Janeiro, M Gloria 62
Fitzpatrick, Patrick M 16
Folland, Gerald B 57
Fomenko, A T 73, 74
Fomin, Dmitri 73
France, Michel Mendès 95
Fuchs, Dmitry 65
Funar, Louis 110
Gajjala, Shailaja 138
Ganguli, Ranjan 101
Gantmacher, F R 79
García-Jurado, Ignacio 62
Garrity, Thomas 12
Gaughan, Edward D 21
Gelbaum, Bernard R 25, 66
Gelca, Răzvan 110
Genkin, Sergey 73
Gerstein, Larry J 15
Ghosh, Pradip Kumar 108
Ghosh, Shamik 9
Gillman, Rick 63
Golberg, Oleg 7
González-Díaz, Julio 62
Goodman, Sue E 117
Goodman, Victor 82
Gopala Krishnan, N S 4
Greene, Robert E 36
Greub, Werner 8

- Grinstead, Charles M 104
 Gupta, R K 132
 Habib, Amber 81
 Han, Qing 42
 Hanspal, Savita 134
 Hardy, G H 92
 Harer, John L 118
 Har-Peled, Sariel 39
 Harris, Joe 13
 Hastings, Stuart P 42
 Helgason, Sigurdur 49
 Henderson, Iain 135
 Hensel, Sebastian 6
 Hilton, Peter 65
 Holton, Derek 65
 Housman, David 63
 Humphreys, James E 7
 Illner, Reinhard 84
 Isaacs, I Martin 3, 6, 72
 Itenberg, Ilia 73
 Ivanov, O A 119
 Ivey, Thomas A 48
 Iwaniec, Henryk 28
 Iyengar, Srikanth B 121
 Jain, S K 10
 Jalan, Arun Kumar 99
 Jankovic', Vladimir 64
 Janusz, Gerald J 14
 Joglekar, S D 85, 86
 Joshi, K D 109
 Kaczor, W J 23, 24
 Kalam, A P J Abdul 128, 133
 Kapoor, Sheetal 134
 Karandikar, R L 66
 Karpenko, Nikita 10
 Kasture, Damodar Y 65
 Katok, Svetlana 23
 Katz, Sheldon 70
 Khanna, Sri Ram 133
 Kharlamov, V M 119
 Khasnabis, Ratan 141
 Khendry, Anu 129
 Khoshnevisan, Davar 105
 Khurana, J M 132
 Khurana, J P 132
 Kincaid, David 99
 Kitaev, A Yu 111
 Knobel, Roger 45
 Knoebel, Arthur 77
 Koren, Israel 29
 Körner, T W 18
 Koslover, Deborah 112
 Kowalski, Emmanuel 28
 Krantz, Steven G 36
 Krishnan, V K 92
 Kuchment, Peter 112
 Kumar, Binay 132
 Kumar, Rajnish 96
 Kumar, Sushil 132
 Kumbhojkar, H V 65
 Landsberg, J M 52, 74
 Lang, Serge 28
 Lanski, Charles 4
 Laubendacher, Reinhard 77
 Lax, Peter D 34
 Lee, Jeffrey M 50
 Lehmann, Ingmar 95
 Leuschke, Graham J 121
 Levi, Mark 90
 Leykin, Anton 121
 Lieb, Elliott H 17
 Lienert, Carl 12
 Light, Will 31
 Liu, Tiankai 7
 Lodder, Jerry 77
 Loss, Michael 77
 Loustaunau, Philippe 14
 Lovász, László 33
 Lozano-Robledo, Álvaro 6
 Lozansky, Edward 64
 Lu, Peng 50
 Luca, Florian 29
 Mac Lane, Saunders 3
 Mahdavi, Kazem 112
 Malik, Rakesh 132
 Mallik, D C V 125
 Maor, Eli 122
 Marsden, Jerrold E 91
 Matic', Ivan 64
 McCleary, John 120
 McCollum, Samantha 84
 McLeod, J Bryce 42
 Mel'nikov, A V 83
 Mercier, Armel 91
 Merkurjev, Alexander 10
 Mesterton-Gibbons, Michael 61, 69
 Michor, Peter W 51
 Miller, Ezra 121
 Miller, Claudia 121
 Milman, Vitali 59
 Miranda, Rick 11
 Moll, Victor H 96
 Montiel, Sebastián 48
 Morandi, Patrick 5
 Morgan, Frank 25, 26
 Morita, Shigeyuli 44
 Mukhopadhyay, Parthasarathi 9
 Mullen, Gary L 5
 Mummert, Carl 5
 Munipalle, Usha 138

- Murphy, David 12
 Murray, D A 45
 Murthy, Kinmera 129
 Murty, V Kumar 93
 Musili, C 66
 Nagpaul, S R 10
 Nahin, Paul J 103
 Narasimha, Roddam 123
 Narlikar, Jayanth V 64
 Narlikar, Mangala 64
 Navarra-Madsen, Junalyn 12
 Nechaev, M L 83
 Netsvetaev, N Yu 119
 Nevanlinna, Rolf 37
 Ni, Lei 50
 Novikov, S P 73, 74
 Nowak, M T 24
 Odifreddi, Piergiorgio 76
 Olmsted, John M H 76
 Ostrowsky, Nicole 129
 Outerelo, Enrique 120
 Paatero, Veikko 37
 Padberg, Manfred W 102
 Palais, Richard S 43
 Palais, Robert A 43
 Parashar, Bhupender 102
 Parthasarathy, R 126, 127
 Pati, Debashis 129
 Pati, Vishwambhar 23
 Patil, B R 133
 Pattanayak, S 66
 Percy, Carl 21
 Pedersen, Jean 65
 Pengelley, David 77
 Pereyra, Maria Cristina 75
 Petkovi, Miodrag S 110
 Petrovic, Nikola 64
 Pine, Eli S 32
 Pinsky, Mark A 47, 58
 Pirzada, S 7
 Poitevin, Pedro 12
 Posamentier, Alfred S 64, 95
 Prasolov, V V 119
 Pruim, Randall 116
 Ramanan, S 50
 Ramaswamy, V 52
 Rao, G Shankar 107
 Rao, Koneru Sarveswara 55
 Rao, S Balachandra 32, 99
 Rauch, Jeffrey 33
 Reddy, Y Mallikarjuna 107
 Rike, Tom 108
 Robinson, R Clark 54
 Robinson, Shawn 12
 Ros, Antonio 48
 Rotman, Joseph J 1
 Rousseau, Cecil 64
 Rowen, Louis Halle 6
 Ruiz, Jesús M 120
 Sadun, Lorenzo 78
 Saha, Suvasis 141
 Salimath, Chandrasekhar 102
 Sally, Jr., Paul J 8, 20, 98
 Sally, Judith D 98
 Sarkar, Utpal 99
 Schechter, Martin 60
 Schwendner, Alex 7
 Selin, Helaine 123
 Sen, M K 9
 Sen, S N 130
 Sepanski, Mark R 2
 Seshu Aiyar, P V 92
 Shahriari, Shahriar 31
 Shailaja, G 136
 Shantha, C K 96
 Sharma, Satish K 114
 Shen A H, 111
 Shen, A 115
 Shirali, Shailesh A 66, 68, 94
 Silva, C E 55
 Simon, Barry 9
 Singh, D 66
 Singh, Kulvinder 132
 Singh, Anurag K 121
 Sinha, K B 66
 Sitaram, Alladi 23
 Smith, Hal L 52
 Snell, J Laurie 104
 Snyder, Brian 12
 Solomon, Ronald 1
 Sossinsky A B 71
 Sparrow, Paul 137
 Stahl, Saul 61
 Stampfli, Joseph 82
 Stankova, Zvezdelina 108
 Subbarayappa, B V 130
 Sule, Aniket 86
 Tabachnikov, Serge 65
 Tao, Terence 57, 80, 87
 Tapp, Kristopher 79
 Tate, John 15
 Taylor, Joseph L 19, 33
 Taylor, Michael E 44, 88
 Tenenbaum, Gérald 95
 Teschl, Gerald 46, 114
 Thieme, Horst R 52
 Tikekar, Vasant G 65
 Tiwari, Arun 128
 Tsolomitis, Antonis 59
 Ullrich, David C 34

- Upendran, S* 131, 132
Vaintrob, Dmitry 7
van Roode, Thea 84
Varadhan, S R S 105
Venkataraman, G 124, 125, 128
Vereshchagin, N K 115
Verma, Surendra 124
Vernon, Guy 137
Villani, Cédric 84
Vinberg, E B 5
Viro, O Ya 119
Viswanath, Kasturi 41
Volkov, S N 83
Vyalyi, M N 111
Waldschmidt, Michel 93
Wallach, Nolan R 8
Walsh, John B 104
Walther, Uli 121
Ward, Lesley A 75
Weaver, Jefferson Hane 64
Weber, Heinrich 27
Weber, Rebecca 38
Werner, Caryn 12
Westland, J Christopher 135
Williams, R J 81
Wilson, B M 92
Yaschenko, V V 41
Yogananda, C S 94
Yudovina, Elena 7
Zalcman, Lawrence 35
Ziegler, Günter M 66
Zworski, Maciej 26

TITLE INDEX

- Abstract Algebra 1
Actuarial Statistics: An Introduction Using R 116
Advanced Calculus (Second Edition) 16
Advanced Modern Algebra (Second Edition) 1
Adventures in Problem Solving 68
Agenda of the Apprentice Scientist, The 133
Agenda of the Apprentice Scientist, The
(Kannada) 129
Algebra: A Graduate Course 3
Algebraic and Geometric Theory of Quadratic
Forms, The 10
Algebraic Curves and Riemann Surfaces 11
Algebraic Geometry: A First Course 13
Algebraic Geometry: A Problem-solving
Approach 12
Algebraic Geometry for Scientists and
Engineers 13
Algebraic Number Fields (Second Edition) 14
Algebra 2
Algebra (Third Edition) 3
Analysis (Second Edition) 17
Analytic Number Theory 28
Analytic Number Theory 29
Applied Linear Algebra: The Decoupling Principle
(Second Edition) 88
Approximately Calculus 31
Arithmetic and Algebra: Numbers and the
Beginnings of Algebra 66
Arithmetic and Algebra: The Challenge and
Thrill 67
Basic Course in Partial Differential Equations, A
42
Basic Quadratic Forms 15
Basic Set Theory 115
Beginning Topology 117
Bhabha and His Magnificent Obsessions 124
BITS of Success 129
Bose and His Statistics 125
Calculus of Finance, The 81
Cartan for Beginners: Differential Geometry
via Moving Frames and Exterior Differential
Systems 48
Chandrasekhar and His Limit 125
Character Theory of Finite Groups 3
Class Field Theory 15
Classical and Quantum Computation 111
Classical Mechanics with Calculus of Variations
and Optimal Control: An Intuitive
Introduction 90
Classical Methods in Ordinary Differential
Equations: With Applications to Boundary
Value Problems 42
Collected Papers of Srinivasa Ramanujan 92
Collective Bargaining 133
Combinatorial Problems and Exercises (Second
Edition) 33
Commutative Algebra (Second Edition) 4
Companion to Analysis, A: A Second First and
First Second Course in Analysis 18
Complex Made Simple 34
Complex Proofs of Real Theorems 34
Complex Variables 35
Computability Theory 38
Computational Topology: An Introduction 118
Computer Arithmetic Algorithms (Second
Edition) 39
Computer Programming and Numerical Analysis:
An Integrated Approach (Revised Edition
with C) 98
Concepts in Abstract Algebra 4
Concise History of Science in India, A (Second
Edition) 130
Consumer Affairs 133
Convex Optimization Theory 101
Course in Abstract Analysis, A 18
Course in Algebra, A 5
Course in Approximation Theory, A 31
Course in Operator Theory, A 58
Cross Disciplinary Advances in Quantum
Computing 112
Cryptography: An Introduction 41
Curves and Surfaces (Second Edition) 48
Decade of the Berkeley Math Circle, A: The
American Experience, Volume I 108
Differential Equations, Mechanics and
Computation 43
Differential Equations with Applications and
Programs 32
Differential Geometry, Lie Groups and Symmetric
Spaces 49
Discrete Mathematical Structures with
Applications to Combinatorics 52
Dynamical Systems and Population Persistence 52
E-Governance 134
Educative JEE 109
Elementary Number Theory: A Collection of
Problems with Solutions 92
Elementary Topology: Problem Textbook 119

- Elements of Combinatorial and Differential Topology 119
 Elliptic Curves, Modular Forms and Other L-Functions 16
 Encyclopaedia of Classical Indian Sciences 123
 Engineering Mathematics (Second Edition) 55
 Engineering Optimization: A Modern Approach 101
 Enumerative Geometry and String Theory 70
 Euclidean Geometry: A Guided Inquiry Approach 70
 Famous Puzzles of Great Mathematicians 110
 Fast Science Facts 124
 Field and Galois Theory 5
 Finite Fields and Applications 5
 Finite Group Theory 6
 First Course in Topology, A: Continuity and Dimension 120
 First Steps in Number Theory: A Primer on Divisibility 93
 Foundations and Applications of Statistics: An Introduction Using R 116
 Foundations of Analysis 19
 Foundations of Mechanics (Second Edition) 91
 Fourier Analysis and Its Applications 57
 Fourier Analysis 56
 Fun and Fundamentals of Mathematics 64
 Functional Analysis: An Introduction 59
 Function Theory of One Complex Variable (Third Edition) 36
 Fundamentals of Mathematical Analysis 20
 Gateway to Modern Mathematics, A: Adventures in Iterations I 68
 Gateway to Modern Mathematics, A: Adventures in Iteration II 68
 Gentle Introduction to Game Theory, A 61
 Geometric Analysis on Symmetric Spaces 49
 Geometric Approximation Algorithms 39
 Geometries 71
 Geometry for College Students 72
 Geometry of Differential Forms 44
 Global Calculus 50
 Global Electronic Commerce: Theory and Case Studies (MIT Press) 135
 Graduate Algebra: Commutative View 6
 Hamilton's Ricci Flow 50
 Harmonic Analysis: From Fourier to Wavelets 75
 Higher Order Fourier Analysis 58
 How to Enjoy Calculus 32
 Human Resource Management 135
 Imaginary Tale, An: The Story of $\sqrt{-1}$ 103
 IMO Compendium, The: A Collection of Problems Suggested for The International Mathematical Olympiads: 1959–2004 64
 Industrial Psychology 136
 International Finance (Second Edition) 136
 International Human Resource Management 137
 Introduction to Analysis, An 21
 Introduction to Analysis (Fifth Edition) 21
 Introduction to Analytic Number Theory 93
 Introduction to Complex Analysis and Geometry, An 36
 Introduction to Complex Analysis (Second Edition) 37
 Introduction to Differential Equations 44
 Introduction to Dynamical Systems, An: Continuous and Discrete 54
 Introduction to Fourier Analysis and Wavelets 58
 Introduction to Game-Theoretic Modelling, An (Second Edition) 61
 Introduction to Graph Theory, An 7
 Introduction to Gröbner Bases, An 14
 Introduction to Lie Algebras and Representation Theory 7
 Introduction to Mathematical Computer Science, An 41
 Introduction to Measure Theory, An 87
 Introduction to Organization Theory 137
 Introduction to Probability (Second Edition) 104
 Introduction to Quantum Graphs 112
 Introduction to Representation Theory 7
 Introduction to the Mathematical Theory of Waves, An 45
 Introduction to the Mathematics of Finance 81
 Introductory Course in Differential Equations 45
 Introductory Course on Mathematical Game Theory, An 62
 Invitation to Classical Analysis 22
 Invitation to Ergodic Theory 55
 Kariamanikkam Srinivasa Krishnan: His Life and Work 125
 Knot Book, The: An Elementary Introduction to the Mathematical Theory of Knots 77
 Knowing the Odds: An Introduction to Probability 104
 Know Your English, Volume 3 131
 Know Your English, Volume 4 132
 Know Your English Volume 1: Idioms and their stories 131
 Know Your English Volume 2: Words frequently confused 131
 Lecture Notes on Functional Analysis: With Applications to Linear Partial Differential Equations 60

www.universitiespress.com

- Linear Algebra (Fourth Edition) 8
 Linear Algebra Done Right (Second Edition) 8
 Linear Algebra in Action 79
 Linear Optimization and Extensions: Problems and Solutions 102
 Managerial Economics and Financial Analysis 138
 Manifolds and Differential Geometry 50
 Mapping Degree Theory 120
 Marketing Research 139
 Math Charmers: Tantalizing Tidbits for the Mind 64
 Mathematical Analysis 23
 Mathematical Analysis: An Introduction 23
 Mathematical Century, The: The 30 Greatest Problems of the Last 100 Years 76
 Mathematical Circles (Russian Experience) 73
 Mathematical Masterpieces: Further Chronicles by the Explorers 77
 Mathematical Methods in Classical and Quantum Physics 114
 Mathematical Methods in Quantum Mechanics: With Applications to Schrodinger Operators 114
 Mathematical Modelling: A Case Studies Approach 84
 Mathematical Olympiad Challenges 110
 Mathematical Omnibus: Thirty Lectures on Classic Mathematics 65
 Mathematical Physics: Advanced Topics 85
 Mathematical Physics: The Basics 86
 Mathematical Vistas: From a Room with Many Windows 65
 Mathematics in Nature 85
 Mathematics of Finance, The: Modelling and Hedging 82
 Mathematics of Financial Obligations 83
 Math Explorer, The: A Journey through the Beauty of Mathematics 64
 Math Problems Notebook, The 110
 Matrix Groups for Undergraduates 79
 Measure and Integration 87
 Measure Theory 88
 Measure Theory and Integration 88
 Models of Conflict and Co-operation 63
 Modern Geometry—Methods and Applications: Part I: The Geometry of Surfaces, Transformation Groups, and Fields (Second Edition) 73
 Modern Geometry—Methods and Applications: Part II. The Geometry and Topology of Manifolds 73
 Modern Geometry—Methods and Applications: Part III. Introduction to Homology Theory 74
 Modern Theory of Integration, A 89
 Moscow Math Circle, A 111
 Numbers and Functions: From a Classical-Experimental Mathematician's Point of View 96
 Number Theory 94
 Number Theory in the Spirit of Ramanujan 94
 Number Theory 93
 Numerical Analysis: Mathematics of Scientific Computing (Third Edition) 99
 Numerical Methods: A Programming-based Approach 99
 Numerical Methods with Programs in BASIC, FORTRAN, Pascal and C++ (Revised Edition) 99
 Operations Research, Models and Methods 102
 Ordinary Differential Equations and Dynamical Systems 46
 p-adic Analysis Compared with Real 23
 Partial Differential Equations 33
 Partial Differential Equations and Boundary-Value Problems with Applications (Third Edition) 47
 Partial Differential Equations (Second Edition) 46
 Paths of Innovators, VOLUME 1 126
 Paths of Innovators, VOLUME 2 127
 Pi: A Biography of the World's Most Mysterious Number 95
 Popular Lectures in Undergraduate Mathematics 65
 Prime Numbers and Their Distribution, The 95
 Primer on Logarithms, A 68
 Primer on Number Sequences, A 69
 Primer on the Calculus of Variations and Optimal Control Theory, A 69
 Principles of Functional Analysis (Second Edition) 70
 Probability: The Science of Uncertainty: with Applications to Investments, Insurance and Engineering 106
 Probability and Statistics for Science and Engineering 107
 Probability Theory and Stochastic Processes 107
 Probability Theory in Finance: A Mathematical Guide to the Black-Scholes Formula 83
 Probability Theory 105
 Probability 105
 Problems and Solutions: International Olympiads on Astronomy and Astrophysics 86
 1001 Problems in Classical Number Theory 91
 Problems in Mathematical Analysis I: Real

- Numbers, Sequences and Series 23
 Problems in Mathematical Analysis II: Continuity and Differentiation 24
 Problems in Mathematical Analysis III: Integration 24
 Problems in Operator Theory 103
 Problems in Real and Complex Analysis 25
 Production and Operations Management: Theory and Practice 139
 Proofs from THE BOOK, 4th edn 66
 Raman and His Effect 128
 Real Analysis and Applications: Including Fourier Series and the Calculus of Variations 26
 Real Analysis 25
 Representations of Finite and Compact Groups 9
 Representation Theory and Automorphic Forms 8
 Research Methodology 141
 Research Methods in Human Resource Management 141
 Roots to Research: A Vertical Development of Mathematical Problems 98
 Saha and His Formula 128
 Science 366: A Chronicle of Science and Technology 124
 Science and Life (English) 132
 Second Year Calculus: From Celestial Mechanics to Special Relativity 33
 Semiclassical Analysis 26
 Short Stories About Numbers 96
 Solutions Manual to a Modern Theory of Integration 90
 Squaring the Circle: Seven Steps to Indian Renaissance 133
 Tensors: Geometry and Applications 73
 Theorems and Counterexamples in Mathematics 66
 Theory of Algebraic Functions of One Variable 67
 Theory of Matrices, The (Volume 1) 79
 Theory of Matrices, The (Volume 2) 79
 Theory of Probability and Stochastic Processes 108
 Top 1000 Scientists: From the Beginning of Time to 2000 AD 124
 Topics in Abstract Algebra (Second Edition) 9
 Topics in Applied Abstract Algebra 10
 Topics in Differential Geometry 51
 Topics in Optimal Transportation 84
 Topics in Random Matrix Theory 80
 Transformation Groups for Beginners 10
 Trigonometric Delights 122
 103 Trigonometry Problems 121
 Twenty-Four Hours of Local Cohomology 121
 Undergraduate Analysis (Second Edition) 28
 Understanding Mathematics 66
 When Least is Best: How Mathematicians Discovered Many Clever Ways to Make Things as Small (or as Large) as Possible 103
 Wings of Fire: An Autobiography 128
 Wings of Fire: An Autobiography (Abridged, Special Student Edition with Exercises) 128
 Winning Solutions 64

REGISTER WITH US

At Universities Press, we believe in sharing details pertaining to our books and the events that we conduct. Should you wish to receive such information by email or by post on a regular basis, you may please write to marketing@universitiespress.com and confirm:

Name and address for correspondence: _____

Email address: _____

STD code: _____ Landline: _____ Mobile: _____

Subject areas of interest: _____

Please tick the relevant box and confirm the mode by which you would like to receive information from us. By Email: By Post: Both:

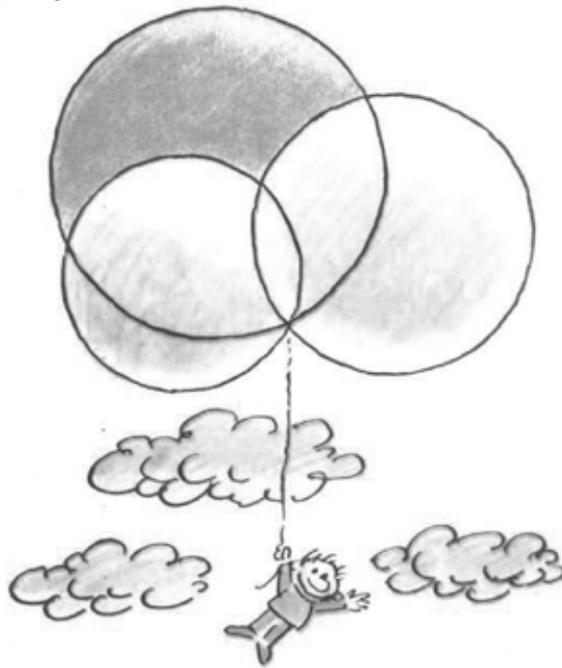
We will be happy to register your details with our database and shall stay in touch.

MSRI Mathematical Circles Library

A Moscow Math Circle

Week-by-Week Problem Sets

Sergey Dorichenko



 Universities Press

MSRI 

 AMS

MATHEMATICAL SCIENCES RESEARCH INSTITUTE
AMERICAN MATHEMATICAL SOCIETY

₹ 395.00 978-81-8128-993-6 264 pp.
Paperback 158 x 240 mm 2016