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CONTENTS

## Across the Board: The Mathematics of Chessboard Problems

John J Watkins

Across the Board is the definitive work on chessboard problems. It is not simply about chess but the chessboard itself—that simple grid of squares so common to games around the world. And, more importantly, the fascinating mathematics behind it.

Using the highly visual language of graph theory, Watkins gently guides the reader to the forefront of current research in mathematics. By solving some of the many exercises sprinkled throughout, the reader can share fully in the excitement of discovery. It *will captivate students and instructors, mathematicians, chess enthusiasts, and puzzle devotees*.

2005	272 pp.	Paperback
978-81-7371-541-9		₹ 395.00

Actuarial Statistics: An Introduction Using R

Shailaja R Deshmukh
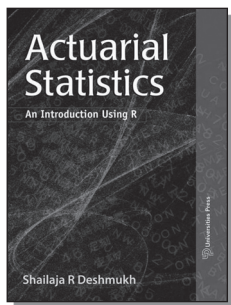
Actuarial science is an interdisciplinary science comprising four subjects—mathematics, statistics, economics and finance. Statistics plays a key role in laying the foundation of actuarial calculations in the presence of uncertainty in the mortality pattern of society and under varying economical conditions. *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 tables, 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		₹ 550.00

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		₹ 625.00

Analytical Solid Geometry

S Pirzada & T A Chishti

This books brings to life the mathematics of perfect solid structures with a special emphasis on the difficulties felt by students in imagining three-dimensional solids. *The contents covers a one-year course in analytical solid geometry for BSc (mathematics) students and will be of great use to civil engineering, architecture and computer science students in their applied mathematics course. The book is rich in exercise problems and solved examples.*

Contents: Coordinates ◆ Plane ◆ Straight Line ◆ Change of Axes ◆ Sphere ◆ Cone ◆ Cylinder ◆ Central Conicoids ◆ Plane Sections of a Conicoid Generating Lines ◆ General Equations of Second Degree Confocal Conicoids ◆ Systems of Conicoids ◆ General Surfaces
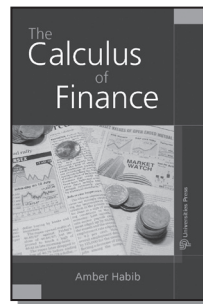
2007	336 pp.	Paperback
978-81-7371-580-8		₹ 395.00

Arithmetic and Algebra: Numbers and the beginnings of Algebra

Shailesh A Shirali

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Calculus of Finance, The

Amber Habib

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		₹ 425.00

Computer Arithmetic Algorithms
(Second Edition)

Israel Koren

This book explains the principles of algorithms used in arithmetic operations on digital computers. It covers basic arithmetic operations like addition, subtraction, multiplication, and division in fixed-point and floating-point number systems in addition to more complex operations such as square root extraction and evaluation of exponential, logarithmic, and trigonometric functions.

This new edition incorporates 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 chapter. *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		₹ 450.00

Convex Optimization Theory

Dimitri P Bertsekas

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

Contents: Basic Concepts of Convex Analysis ◆ Basic Concepts of Polyhedral Convexity ◆ Basic Concepts of Convex Optimization Geometric Duality Framework ◆ Duality and Optimization ◆ *Appendix A: Mathematical Background & Notes and Sources* ◆ *Supplementary Chapter 6 on Convex Optimization Algorithms*

2010	420 pp.	Paperback
978-81-7371-714-7		₹ 625.00

Differential Equations with Applications and Programs

S Balachandra Rao & H R Anuradha

This book is designed to serve as a textbook for undergraduate students of mathematics, physics, physical chemistry, engineering, etc. It 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 | | ₹ 425.00 |

Discrete Mathematical Structures with Applications to Combinatorics

V Ramaswamy

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 in computer science, information science and other engineering branches. The chapters 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 | | ₹ 275.00 |

Educative JEE: Mathematics
(Third Edition)

K D Joshi
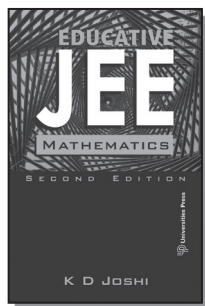
Educative JEE is an attempt to lay before the students both the concepts as well as the process of solving

problems at the JEE (the Joint Entrance Examination conducted to gain entry into the IITs). 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 it and learning a few related new concepts. The solutions then come as natural corollaries. I*t also contains some helpful tips aimed at sharpening the thinking ability and increasing the mathematical maturity of the student*.

Key Features: In the second edition ◆ a few more problems or ◆ a few figures have been redrawn ◆ two appendices ◆ a few more problems or, occasionally, a new solution to an existing problem have been added ◆ a few figures have been redrawn and some new figures have been added to help understand the text ◆ two appendices, one on matrices and one on solid coordinate geometry have been included. They have been explained in detail, in keeping with the new JEE syllabus.

Contents: *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 ◆ *Appendix 1: More about Matrices ◆ Appendix 2: Solid Coordinate Geometry ◆ Answers to Exercises in Part - II ◆ Index*

| 2010 | 1124 pp. | Paperback |
| 978-81-7371-712-3 | | ₹ 675.00 |

Elementary Number Theory: A Collection of Problems with Solutions

V K Krishnan
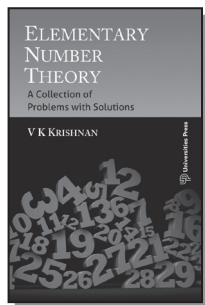
This book gives a brief introduction to elementary number theory and includes a collection of three hundred problems and their solutions. Number theory deals with the properties of integers. The most interesting and important property of integers is that of divisibility and congruence.

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 ResiduesPrimitive 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*

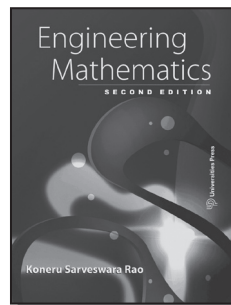|		
2012	260 pp.	Paperback
978-81-7371-743-7		₹ 295.00

Engineering Mathematics
(Second Edition)

Koneru Sarveswara Rao

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 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
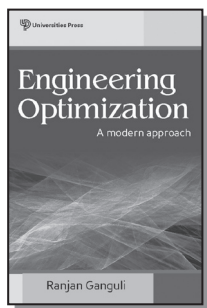
Distributions ◆ Statistical Estimation and Inference Curve Fitting, Regression and Correlation ◆ Numerical Methods ◆ *Epilogue*

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

2012	704 pp.	Paperback
978-81-7371-772-7		₹ 475.00

Engineering Optimization: A Modern Approach

Ranjan Ganguli

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		₹ 375.00

Excursions into Mathematics: The Millennium Edition

Anatole Beck, Michael N Bleicher & Donald W Crowe

Since it was first published three decades ago, *this book has been one of the most popular mathematical books written for a general audience*. Taking the reader for short 'excursions' into several specific disciplines of mathematics, it makes mathematical concepts accessible to a wide audience.

The all-new Millennium Edition is updated with current research and new solutions to outstanding problems that have been discovered since the last edition was printed, such as the solution to the well-known 'four-color problem'.

This is an exciting revision of the original, much-loved classic. *Everyone with an interest in mathematics should read this book*.

Contents: *Foreword* ◆ Note to the Instructor ◆ Euler's Formula for Polyhedra, and Related Topics ◆ Introduction ◆ Regular polyhedral ◆ Deltahedra ◆ Polyhedra without Diagonals ◆ The n-dimensional Cube and the Tower of Hanoi ◆ The Four-color Problem and the Five-color Theorem ◆ The Conquest of Saturn, The Scramble for Africa, and Other Problems ◆ The Search for Perfect Numbers ◆ Introduction ◆ Prime Numbers and Factorization ◆ Euclidean Perfect Numbers ◆ Primes and Their Distribution ◆ Factorization Techniques ◆ Non-Euclidean Perfect Numbers ◆ Extensions and Generalizations ◆ What is Area? ◆ Introduction ◆ Rectangles and Grid Figures ◆ Triangles ◆ Polygons ◆ Polygonal Regions ◆ Area in General ◆ Pathology ◆ Some Exotic Geometries ◆ Historical Background ◆ Spherical Geometry ◆ Absolute Geometry ◆ More History-Saccheri, Bolyai and Labachevsky ◆ Hyperbolic Geometry ◆ New Beginnings ◆ Analytic

Geometry-A Reminder ❖ Finite Arithmetics ❖ Finite Geometries ❖ Application ❖ Circles and Quadratic Equations ❖ Finite Affine Planes ❖ Finite Projective Planes ❖ Ovals in a Finite Plane ❖ A Finite Version of Poincare's Universe ❖ Games ❖ Introduction ❖ Some Tree Games ❖ The Game of Hex ❖ The Game of Nim ❖ Games of Chance ❖ Matrix Games ❖ Applications of Matrix Games ❖ Positive-sum Games ❖ Sharing ❖ Cooperative Games ❖ What's in a Name? ❖ Introduction ❖ Historical Background ❖ Place Notation for the Base b ❖ Some Properties of Natural number ❖ Related to Notation ❖ Fractions ❖ First Comments ❖ Farey Fractions ❖ Egyptian Fractions ❖ The Euclidean Algorithm ❖ Continued Fractions ❖ Decimal Fractions ❖ Concluding Remarks ❖ *Glossary of Symbols* ❖ *Appendix* ❖ *Index*

2003	528 pp.	Paperback
978-81-7371-441-2		₹ 550.00

Explorations in Mathematics

A A Hattangadi

The book deals with mathematical concepts from high school onwards. It discusses Pythagoras' Theorem, logarithms, prime numbers, Pi, Fibonacci sequence and its variations, how to multiply extremely large integers, the Gregorian calendar, how a PC can be programmed using BASIC, number systems such as decimal, binary, octal and hexadecimal systems, and finally how string variables in the BASIC language can convert figures (in a cheque for example) into words.

2001	240 pp.	Paperback
978-81-7371-387-3		₹ 325.00

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. To help readers grasp field.

2010	304 pp.	Paperback
978-81-8489-621-3		₹ 495.00

Finite Group Theory

I Martin Isaacs

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		₹ 295.00

Group Theory: Selected Problems

B Sury

The selection of problems in *Group Theory* is *principally aimed at undergraduate (honours) and postgraduate students of mathematics*. Excepting a few, these problems are meant only to supplement the existing ones in standard texts.

The comments interspersed in the text help to put the problems in perspective with other problems and with the subject itself. *The intention of the book is two-fold:* to introduce via problems some concepts not usually taught at the master's level, and reinforce existing knowledge by means of new problems.

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

2004	168 pp.	Paperback
978-81-7371-491-7		₹ 195.00

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		₹ 195.00

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		₹ 375.00

Introduction to Analysis, An

Arlen Brown & Carl Pearcy

This book is intended to serve as a textbook for an introductory course in mathematical analysis. In preliminary form it has been used in this way at the University of Michigan, Indiana University, and Texas A&M University. *The book addresses the needs of a beginning 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		₹ 525.00

## 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		₹ 650.00

Introduction to Graph Theory, An

S Pirzada
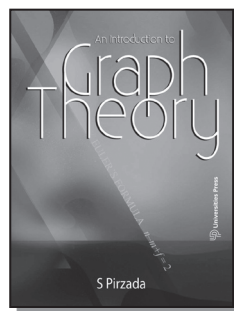
In this comprehensive and up-to-date book on graph theory, the reader is provided a thorough understanding of the fundamentals of the subject - the structure of graphs, the techniques used to analyse problems in graph theory, and the use of graph-theoretical algorithms in mathematics, engineering and 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		₹ 395.00

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 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 Mathematical Computer Science, An

Kasturi Viswanath

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		₹ 550.00

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		₹ 725.00

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		₹ 530.00

Linear Optimization and Extensions: Problems and Solutions

Dimitris Alevras & Manfred W Padberg

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 in finite 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 in finite precision arithmetic, the equivalence of linear optimisation and polyhedral separation; The foundations of mixed-integer programming and combinatorial optimisation.

Key Features: 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 in finite precision arithmetic, the equivalence of linear optimisation and polyhedral separation ◆ The foundations of mixed-integer programming and combinatorial optimisation.

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

Math Charmers: Tantalizing Tidbits for the Mind

Alfred S Posamentier

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		₹ 395.00

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

Jefferson Hane Weaver

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.

He covers all the basics: irrational and imaginary numbers, algebra, geometry, trigono-metry, 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		₹ 395.00

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		₹ 525.00

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		₹ 275.00

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

Mathematical Century, The: The 30 Greatest Problems of the Last 100 Years

Piergiorgio Odifreddi

The author concentrates on thirty highlights of pure and applied mathematics. He opens by discussing the four main philosophical foundations of mathematics of the nineteenth century and ends by describing the four most important open mathematical problems of the twenty first century.

He devotes equal attention to pure and applied mathematics, with applications ranging from physics and computer science to biology and economics.

Special attention is dedicated to the famous '23 problems' outlined by David Hilbert in his address to the *International Congress of Mathematicians in 1900* as a research programme for the new century, and to the work of the winners of the Fields Medal, the equivalent of a Nobel Prize in mathematics.

2005	224 pp.	Paperback
978-81-7371-542-6		₹ 325.00

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		₹ 625.00

Mathematical Methods in Classical and Quantum Physics

Tulsi Dass & Satish K Sharma

The book is intended to provide an adequate background for various theoretical physics courses, especially those in classical mechanics, electrodynamics, quantum mechanics and statistical physics. Each topic is dealt with in a generally self-contained manner and *the text is interspersed with a number of solved examples and a large number of exercise problems*.

Contents: *Preface* ◆ *Acknowledgements* ◆ Vector analysis ◆ Matrices and Linear Vector Spaces ◆ Tensors ◆ Complex Variables ◆ Ordinary Differential Equations ◆ Special Functions ◆ Calculus of Variations ◆ Function Spaces, Orthogonal Expansions and Strum-Liouville Theory ◆ Integral Transforms: Generalized Functions ◆ Partial Differential Equations ◆ Green's Functions ◆ Probability and Statistics ◆ Elements of Group Theory ◆ *Appendix* ◆ *References* ◆ *Index*

1998	716 pp.	Paperback
978-81-7371-089-6		₹ 750.00

Mathematical Olympiad Challenges
(Second Edition)

Titu Andreescu & Räzvan Gelca

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.

2005	280 pp.	Paperback
978-81-8128-323-8		₹ 395.00

Mathematical Olympiad Treasures

Titu Andreescu & Bogdan Enescu

This book aims at building a bridge between ordinary high-school exercises and more sophisticated, intricate and abstract concepts and problems in undergraduate mathematics. The book contains a stimulating collection of problems in the subjects of geometry and trigonometry, algebra, number theory and combinatorics.

While it may be considered a sequel to *Mathematical Olympiad Challenges*, the focus of *Treasures* is on engaging a wider audience of undergraduates to think creatively in applying techniques and strategies to problems in the real world.

Throughout the book, students are encouraged to express their ideas, conjectures, and conclusions in writing.

The goal is to help readers develop a host of new mathematical tools and strategies that will be useful beyond the classroom and in a number of disciplines.

2005	248 pp.	Paperback
978-81-8128-322-1		₹ 395.00

Mathematical Physics: The Basics

S D Joglekar

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 post graduate 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		₹ 325.00

Mathematical Physics: Advanced Topics

S D Joglekar

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		₹ 325.00

Mathematical Vistas: From a Room with Many Windows

Peter Hilton, Derek Holton & Jean Pedersen
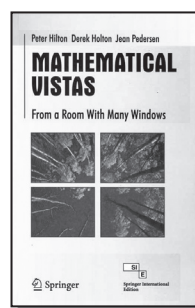
The goal of Mathematical Vistas is to stimulate the interest of bright people in mathematics. The book consists of nine related mathematical essays which will intrigue and inform the curious reader. In order to offer a broad spectrum of exciting developments in mathematics, topics are treated at different 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		₹ 625.00

Mathematics in Nature

John A Adam

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 | | ₹ 525.00 |

Measure and Probability

S R Athreya & V S Sunder
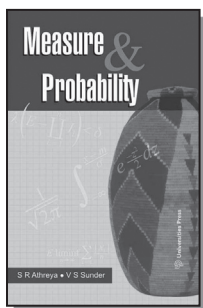
This book has been designed primarily for students at the masters and doctoral levels. It covers the fundamentals of measure theory and probability theory. Among the highlights are alternative proofs of Riesz representation theorem and the law of large numbers. The appendix treats many basic topics such as metric spaces, topological spaces and the Stone–Weierstrass theorem.

Contents: *Preface* ⬧ Probabilities and Measures: Introduction ⬧ σ-Algebras as Events ⬧ Algebras, Monotone Classes, etc ⬧ Preliminaries on Measures ⬧ Outer Measures and Caratheodory Extension Lebesgue Measure ⬧ Regularity ⬧ Bernoulli Trials Integration: Measurable Functions ⬧ Integration ⬧ a.e. Considerations ⬧ Random Variables: Distribution and Expectation ⬧ Independent Events and Tail σ-Algebra ⬧ Some Distributions ⬧ Conditional

Expectation ⬧ Probability Measures on Product Spaces: Product Measures ⬧ Joint Distribution and Independence ⬧ Probability Measures on Infinite Product Spaces ⬧ Kolmogorov Consistency Theorem ⬧ Characteristics and Convergences: Characteristic Functions ⬧ Modes of Convergence ⬧ Central Limit Theorem ⬧ Law of Large Numbers ⬧ Markov Chains: Discrete Time MC ⬧ Examples ⬧ Classification of States ⬧ Strong Markov Property ⬧ Stationary Distribution ⬧ Limit Theorems ⬧ Some Analysis: Complex Measures ⬧ Lp Spaces ⬧ Radon–Nikodym Theorem ⬧ Change of Variables ⬧ Differentiation ⬧ The Riesz Representation Theorem ⬧ *Appendix: Metric Spaces* ⬧ *Topological Spaces* ⬧ *Compactness* ⬧ *The Stone–Weierstrass Theorem* ⬧ *Tables* ⬧ *References* ⬧ *Index*

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

| 2008 | 232 pp. | Paperback |
| 978-81-7371-613-3 | | ₹ 425.00 |

Measure Theory

J L Doob

This book is different from other books on measure theory in that it accepts probability theory as an essential part of measure theory. This means that many examples are taken from probability; that probabilistic concepts such as independence, Markov processes, and conditional expectations are integrated into the text rather than being relegate to an appendix; that more attention is paid to the role of algebras than is customary; and that the metric defining the distance between sets as the measure of their symmetric difference is exploited more than is customary.

| 2010 | 232 pp. | Paperback |
| 978-81-8489-615-2 | | ₹ 475.00 |

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		₹ 725.00

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		₹ 725.00

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 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 eo homology of the unitary groups ◆ The homology theory offibre bundles (skew products) ◆ The extension problem for maps, homotopies, and cross-sections. Obstruction cohomology classes ◆ Homology theory and methods for computing homotopy groups. The Cartan-Serre theorem. Cohomology operations. Vector bundles. ◆ Homology theory and the fundamental group ◆ The cohomology groups of hyperelliptic Riemann surfaces. Jacobi tori. Geodesics on multi-axis ellipsoids. Relationship to finite-gapotentials ◆ The simplest properties of

Kahler manifolds. Abelian tori ◆ Sheaf cohomology ◆ Critical Points of Smooth Functions and Homology Theory ◆ Morse functions and cell complexes ◆ The Morse inequalities ◆ Morse-Smale functions. Handles. Surfaces ◆ Poincare duality ◆ Critical points of smooth functions and the Lyusternik - Shnirelman category of a manifold ◆ Critical manifolds and the Morse inequalities. Functions with symmetry ◆ Critical points of functionals and the topology of the path space $\Omega(M)$ ◆ 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 nobody problem ◆ Cobordisms and Smooth Structures ◆ Characteristic numbers. Cobordisms. Cycles and submanifolds. The signature of a manifold ◆ Smooth structures on the 7-dimensional sphere. The classification problem for smooth manifolds (normal invariants). Reidemeister torsion and the fundamental hypothesis (Hauptvermutung) of combinatorial topology ◆ *Bibliography* ◆ *Appendix 1 (by S. P. Novikov)* ◆ *An Analogue of Morse Theory for Many-Valued Functions. Certain Properties of Poisson Brackets* ◆ *Appendix 2 (by A. T. Fomenko)* ◆ *Plateau's Problem. Spectral Bordisms and Globally Minimal Surfaces in Riemannian Manifolds* ◆ *Index* ◆ *Errata to Parts I and 11* ◆ *Index* ◆ *Errata to Parts I and 11*

1990	416 pp.	Paperback
978-81-8489-660-2		₹ 725.00

Number Theory

Shailesh A Shirali & 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		₹ 225.00

Numerical Methods

W Boehm & H Prautzsch

The development and analysis of constructive algorithms in numerical mathematics has become a focus of applied mathematics since the practical realisation of these algorithms by electronic computers is no longer restricted to trivial examples.

This book describes algorithmic solutions whose basic ideas are common to a variety of mathematical problems. By means of the methods presented, the reader will acquire the skills—besides a fundamental knowledge—to successfully work on related subjects in this field.

Contents: Fundamental Concepts ◆ Algorithms and Error Propagation ◆ Matrices ◆ Linear Equations and Inequalities ◆ Gaussian Elimination ◆ The LU Factorization ◆ The Exchange Algorithm ◆ The Cholesky Factorizaton ◆ The QU Factorization ◆ Relaxation Methods ◆ Data Fitting ◆ Linear Optimization ◆ Iteration ◆ Vector Iteration ◆ The KR Algorithm ◆ One-Dimensional Iteration ◆ Multi-dimensional Iteration ◆ Roots of Polynomials ◆ Bernoulli's Method ◆ The QD Algorithm ◆ Interpolation and Discrete Approximation ◆ Interpolation ◆ Discrete Approximation ◆ Polynomials in Bezier Form ◆ Splines ◆ Numerical Differentiation and Integration: Numericals Differentiation and

Integration ◆ Extrapolation ◆ One-Step Methods for Differential Equations ◆ Linear Multi-Step Methods for Differential Equations ◆ The Methods by Ritz and Galerkin ◆ The Finite Element Method ◆ *Bibliography* ◆ *Index*

2005	196 pp.	Paperback
978-81-7371-534-1		₹ 310.00

Numerical Methods with Programs in BASIC, FORTRAN, Pascal and C++ (Revised Edition)

S Balachandra Rao & C K Shantha

The book discusses the important numerical methods which are frequently used in mathematical, physical, engineering and 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		₹ 450.00

Partial Differential Equations

Jeffrey Rauch

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

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

Alfred S Posamentier & Ingmar Lehmann

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 eπ > πe* ◆ *Appendix D: A Rioe around the Regular Polygons* ◆ *References* ◆ *Index*

| 2006	324 pp.	Paperback
978-81-7371-561-7		₹ 495.00

Popular Lectures in Undergraduate Mathematics

*Sadashiv G Deo, Damodar Y Kasture,
H V Kumbhojkar & Vasant G Tikekar*

"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 class-room 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		₹ 425.00

Probability and Statistics for Science and Engineering

G Shanker Rao
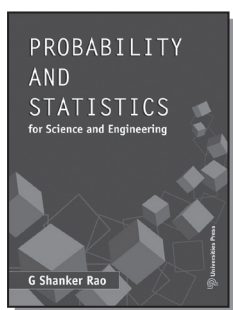
A firm understanding of the concepts of probability and statistics is essential for the quantitative analysis of risk, uncertainty and reliability in engineering problems. *This introductory textbook, rich in solved problems, provides a comprehensive coverage of the topics of probability and statistics for an undergraduate course in science and engineering*. The theoretical concepts are dealt with in a straightforward manner, with emphasis on their applications to real-world problems. *Exercises of varied levels of difficulty have been included* so as to give the student an exposure to wide variety of practical situations where the applications of the concepts learnt play a role in decision making.

Contents: *Preface* ⬧ Probability ⬧ Random Variables ⬧ Probability Distributions ⬧ Sampling Distributions ⬧ Theory of Estimation ⬧ Hypothesis Testing ⬧ Distribution ⬧ Test of Significance: Small Samples ⬧ Curve Fitting ⬧ Correlation and Regression ⬧ Queueing Theory ⬧ Stochastic Process ⬧ *Appendix* ⬧ *Bibliography* ⬧ *Index*

2011	524 pp.	Paperback
978-81-7371-744-4		₹ 425.00

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

Second Year Calculus: From Celestial Mechanics to Special Relativity

David M Bressoud

Second Year Calculus: From Celestial Mechanics to Special Relativity covers multi-variable and vector calculus, emphasizing the historical physical problems which gave rise to the concepts of

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

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

2010	416 pp.	Paperback
978-81-8489-622-0		₹ 675.00

Short Courses in Mathematics

S Kumaresan

This book is a collection of lectures delivered by the author at mathematics instructional workshops and refresher courses. Topics covered include the spectral theorem for operators in the finite dimensional case, Lebesgue integration theory via the Daniell method, Fourier transform on R, solution of the Dirichlet problem for the potential equation in the plane by Perron's method, the Sturn – Liouville problem, the interior regularity of the solutions of elliptic equations and a thorough introduction to representation theory of topological groups.

2003	136 pp.	Paperback
978-81-7371-453-5		₹ 200.00

Short Stories About Numbers

Rajnish Kumar

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 Short Stories of Numbers 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		₹ 295.00

Theorems and Counterexamples in Mathematics

Bernard R Gelbaum & John M H Olmasted

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

Theory of Probability and Stochastic Processes

Pradip Kumar Ghosh

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 ⟡ Introduction ⟡ Uncertainty and Relative Frequency ⟡ Elements of Set Theory ⟡ Probability and Sample Space ⟡ Conditional Probability and Joint Probability ⟡ Independence and Bayes' Theorem ⟡ Bernoulli Trials ⟡ Exercises ⟡ Theory of Random Variables ⟡ Random Variables: An Introduction ⟡ Probability Distribution ⟡ Conditional Distribution ⟡ Exercises ⟡ Functional Transformation of One Random Variable ⟡ Introduction ⟡ Functions of a Random Variable ⟡ Mean, Variance and Moments of Random Variables ⟡ Generating Function and Moments ⟡ Chebychev's Inequality ⟡ Characteristic Functions of Random Variable ⟡ Exercises ⟡ Statistical Characteristics of Two or More Random Variables ⟡ Introduction ⟡ One Function of Several Random Variables ⟡ Multidimensional Random Variables ⟡ Multidimensional Characteristic Function ⟡ Central Limit Theorem ⟡ Conditional Distribution and Density ⟡ Exercises ⟡ Operations on Multivariate Random Variables ⟡ Introduction ⟡ Expected Value of a Function of Random Variables ⟡ Joint Characteristic Function ⟡ Jointly Gaussian Random Variables ⟡ General Transformation of Multiple

Random Variables ⟡ Exercises ⟡ Correlation Theory of Random Process ⟡ Introduction ⟡ Distribution and Density Function ⟡ Stationarity and Statistical Independence ⟡ Time Average and Ergodicity ⟡ Correlation Function and Its Properties ⟡ Measuring the Correlation Function of Random Processes ⟡ Discrete Correlation Function ⟡ Gaussian Random Process ⟡ Differentiation and Integration of Random Processes ⟡ Exercises ⟡ Spectral Representation of Random Processes ⟡ Introduction ⟡ Power Spectrum of Random Processes ⟡ Autocorrelation and Power Spectrum Relationship ⟡ Cross-Power Spectral Density ⟡ Relation between Cross-Power Spectral Density and Cross-Correlation ⟡ Noise Definitions ⟡ Exercises ⟡ Response of Linear System to Random Signals ⟡ Introduction ⟡ Mathematical Model of Physical Systems ⟡ System Response ⟡ Mean and Mean-Square Value of System Response ⟡ Autocorrelation Function of a Random Output Signal ⟡ Cross-Correlation Function between Input and Output Random Processes ⟡ Power Spectrum of Output Processes ⟡ Band-Limited and Narrowband Processes ⟡ Modelling of Noise Sources ⟡ Available Power Gain, Noise Figure and Equivalent Input Noise Temperature ⟡ Exercises ⟡ *Bibliography* ⟡ *Index*

2010	284 pp.	Paperback
978-81-7371-673-7		₹ 295.00

Topics in Abstract Algebra
(Second Edition)

M K Sen, Shamik Ghosh & Parthasarathi Mukhopadhyay

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		₹ 350.00

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		₹ 375.00

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 around 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		₹ 895.00

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		₹ 325.00

Understanding Probability and Statistics: A Book of Problems

Ruma Falk

This is a book of creative statistical problems intended to allay the mathematical fears of the average students through 'experiencing the revelation of understanding'. The collection encompasses a range of problems from high school to graduate level and takes the active, hands-on approach to the assimilation of basic concepts. Through the use of humour and the familiar, the author has made an often overwhelming subject less intimidating. *Because neither calculus nor other techniques of higher mathematics are required for arriving at solutions, the book is quite appropriate for non-mathematicians. However, this text may be of benefit to the more mathematically inclined as well, because although technically elementary, it is conceptually advanced.*

Contents: *Preface* ⬧ *Problems to Solve* ⬧ Descriptive Statistics I ⬧ Probability I ⬧ Reasoning across Domains ⬧ Multiple-choice Problems ⬧ Descriptive Statistics II ⬧ Probability II ⬧ Normal Distribution ⬧ Sampling Distribution ⬧ Inference ⬧ Answers ⬧ Answers for Part I: Problem to Solve ⬧ Answer for Part II: Multiple-Choice Problems ⬧ *References* ⬧ *Index*

2003	256 pp.	Paperback
978-81-7371-440-5		₹ 275.00

Wavelets: Theory, Applications, Implementation

M V Altaisky

This book aims at presenting a deductive scheme to show where and when the scale-invariance of Nature meets the representations of the affine group. *It includes standard trends in wavelet analysis and discrete wavelet transform, some results obtained by the author in collaboration with different people in data processing, and a number of C++ programs which can be used by physicists, economists or biologists for the analysis of the time series.* The general mathematical and physical ideas of wavelets are presented without sinking into details of elaborate numeric schemes; at the same time it enables the reader to solve wavelet-related problems on the computer. *The book also* contains some new ideas developed by the author for non-standard applications of wavelets in quantum mechanics, quantum field theory and biology.

Contents: Mathematical Symbols and Notations ⬧ Introduction ⬧ Fundamental Concepts of Wavelets Transform ⬧ The Method of Wavelet Transform ⬧ Wavelets and Fractals ⬧ Wavelets and Functional Analysis ⬧ Discretization ⬧ Applications ⬧ Wavelets in Mathematical Physics ⬧ *Conclusion* ⬧ *Index*

2004	164 pp.	Paperback
978-81-7371-503-7		₹ 295.00

When Least is Best: How Mathematicians Discovered Many Clever Ways to Make Things as Small (or as Large) as Possible

Paul J Nahin

What is the best way to photograph a speeding bullet? Why does light move through glass in the least amount of time possible? How can lost hikers find their way out of a forest? What will rainbows look like in the future? Why do soap bubbles have a shape that gives them the least area?

By combining the mathematical history of extrema with contemporary examples, *Paul J. Nahin* answers these intriguing questions and more in this engaging and witty volume. *Nahin* tells the story of Dido's problem, Fermat and Descartes, Torricelli, Bishop Berkeley, Goldschmidt, and more.

This is the first book on optimisation written for a wide audience, and math enthusiasts of all backgrounds will delight in its lively topics.

2004	392 pp.	Paperback
978-81-7371-510-5		₹ 475.00

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		₹ 525.00

American Mathematical Society
(Indian Edition)

The American Mathematical Society (AMS) furthers the interests of mathematical research and scholarship worldwide through its publications. It fosters an awareness and appreciation of mathematics and its connections to other disciplines and everyday life.

The special Indian editions of AMS titles are distributed exclusively by Universities Press for the benefit of students, teachers and researchers.

1001 Problems in Classical Number Theory

Jean-Marie De Koninck & Armel Mercier

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		₹ 755.00

Abstract Algebra

Ronald Solomon

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		₹ 500.00

Advanced Calculus
(Second Edition)

Patrick M Fitzpatrick

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 ◆ Integartion: 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 Integartion 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		₹ 1050.00

Advanced Modern Algebra
(Second Edition)

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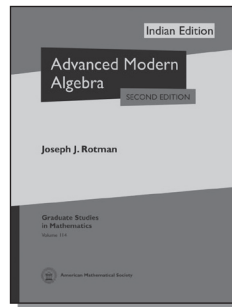
This book is designed as a text for the first year of graduate algebra, but it can also serve as a reference since it contains more advanced topics as well. This second edition has a different organization than the first. It begins with a discussion of the cubic and quartic equations, which leads into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

The study of commutative rings continues with prime and maximal ideals, unique factorization, noetherian rings, Zorn's lemma and applications, varieties, and Gröbner bases. Next, noncommutative rings and modules are discussed, treating tensor product, projective, injective, and flat modules, categories, functors, and natural transformations, categorical constructions (including direct and inverse limits), and adjoint functors. Then follow group representations: Wedderburn-Artin theorems, character theory, theorems of Burnside and Frobenius, division rings, Brauer groups, and abelian categories. Advanced linear algebra treats canonical forms for matrices and the structure of modules over PIDs, followed by multilinear algebra.

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

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

2014	1024 pp.	Paperback
97-81-4704-1916-5		₹ 1400.00

Algebra

Mark R Sepanski
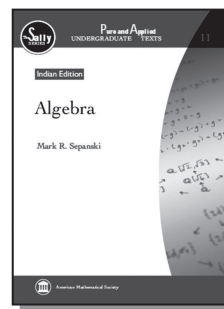
Mark Sepanski's Algebra is a readable introduction to the delightful world of modern algebra. Beginning with concrete examples from the study of integers and modular arithmetic, the text steadily familiarizes the reader with greater levels of abstraction as it moves through the study of groups, rings, 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		₹ 795.00

Algebra
(Third Edition)

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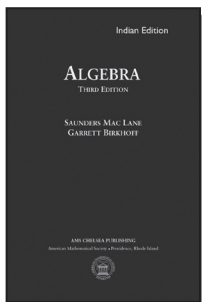
This book presents modern algebra from first principles and is accessible to undergraduates or graduates. It combines standard materials and necessary algebraic manipulations with general concepts that clarify meaning and importance.

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		₹ 920.00

Algebra: A Graduate Course

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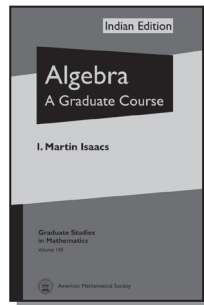
This book, contains more than enough material for a two-semester graduate-level abstract algebra course, including groups, rings and modules, fields and Galois theory, an introduction to algebraic number theory, and the rudiments of algebraic geometry. *This book could be used for self study as well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

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

2010	528 pp.	Paperback
978-0-8218-5214-9		₹ 895.00

Algebraic and Geometric Theory of Quadratic Forms, The

*Richard Elman, Nikita Karpenko &
Alexander Merkurjev*

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		₹ 895.00

Algebraic Curves and Riemann Surfaces

Rick Miranda
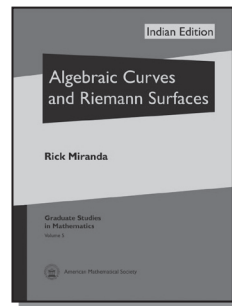
In this book, *Miranda* takes the approach that algebraic curves are best encountered for the first time over the complex numbers, where the reader''s classical intuition about surfaces, integration, and other concepts can be brought into play. Therefore, many examples of algebraic curves are presented 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 the 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		₹ 950.00

Algebraic Geometry for Scientists and Engineers

Shreeram S Abhyankar
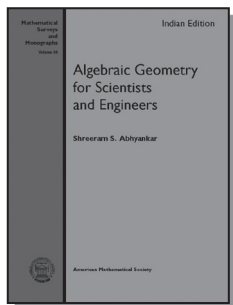
This book, based on lectures presented in courses on algebraic geometry taught by the author at Purdue University, *is intended for engineers and scientists (especially computer scientists)*, as well as graduate students and advanced undergraduates in mathematics. In addition to providing a concrete 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		₹ 755.00

Algebraic Number Fields
(Second Edition)

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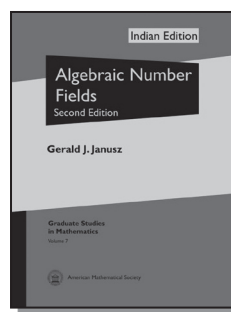
The book is directed toward students with a minimal background who want to learn class field theory for number fields. The only prerequisite for reading it is some elementary Galois theory. The first three chapters lay out the necessary background in number fields, such as the arithmetic of fields, Dedekind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

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

Contents: Subrings of fields ◆ Complete fields ◆ Decomposition groups and the Artin map ◆ Analytic

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

2010	288 pp.	Paperback
978-0-8218-5219-4		₹ 675.00

NEW

Analysis
(Second Edition)
Elliott H Lieb & Micheal Loss
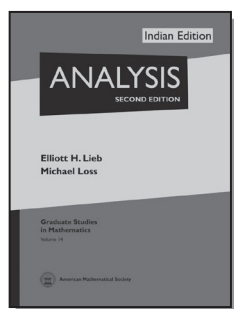
Significantly revised and expanded, this new Second Edition provides readers at all levels—from beginning students to practicing analysts—with the basic concepts and standard tools necessary to solve problems of analysis, and how to apply these concepts to research in a variety of areas.

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		₹ 760.00

Analytic Number Theory
Henryk Iwaniec & Emmanuel Kowalski
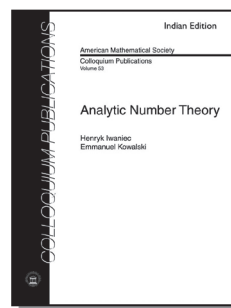
Analytic Number Theory distinguishes itself by the variety of tools it uses to establish results. One of the primary attractions of this theory is its vast diversity of concepts and methods. *The main goals of this book are to show the scope of the theory, both in classical and modern directions, and 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		₹ 920.00

Applied Linear Algebra: The Decoupling Principle
(Second Edition)

Lorenzo Sadun

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		₹ 755.00

Approximately Calculus

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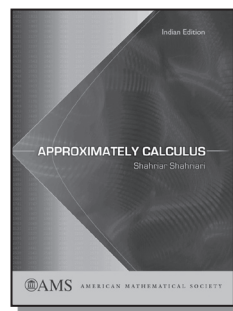
Is there always a prime number between n and 2n? Where, approximately, is the millionth prime? And just what does calculus have to do with answering either of these questions? It turns out that calculus has a lot to do with both questions, as this book can show you.

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		₹ 720.00

NEW

Basic Course in Partial Differential Equations, A

Qing Han
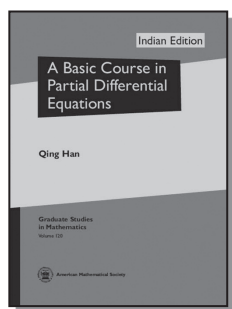
This is a textbook for an introductory graduate course on partial differential equations. Han focuses on linear equations of first and second

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		₹ 720.00

Basic Quadratic Forms

Larry J Gerstein
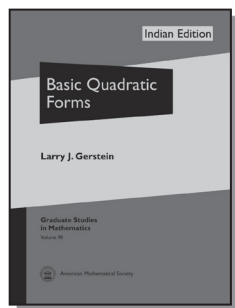
The arithmetic theory of quadratic forms is a rich branch of number theory that has had important applications to several areas of pure mathematics—particularly group theory and topology—as well as to cryptography and coding theory. *This book is a self-contained introduction to quadratic forms that 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 Q_p ⬥ Quadratic spaces over Q ⬥ Lattices over principal ideal domains ⬥ Initial integral results ⬥ Local classification of lattices ⬥ The local‑global approach to lattices ⬥ Lattices over Fq ⬥ Applications to cryptography ⬥ Further reading ⬥ *Bibliography* ⬥ *Index*

2012	255 pp.	Paperback
978-0-8218-8720-2		₹ 680.00

Basic Set Theory

A. Shen and N. K. Vereshchagin
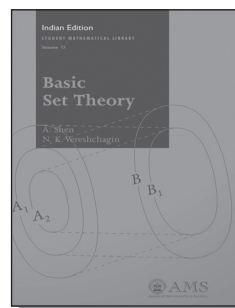
The main notions of set theory (cardinals, ordinals, transfinite induction) are fundamental to all mathematicians, not only to those who specialize in mathematical logic or set‑theoretic topology. Basic set theory is generally given a brief overview in courses on analysis, algebra, or topology, even 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
97-81-4704-1918-9		₹ 640.00

Beginning Topology

Sue E Goodman
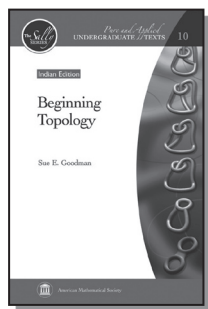
Beginning Topology is designed to give undergraduate students a broad notion of the scope of topology in areas of point-set, geometric, combinatorial, differential, and algebraic topology, including an introduction to knot theory. A primary goal is to expose students to some recent research and to get 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*

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

Thomas A Ivey & J M Landsberg
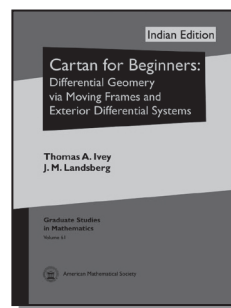
This book is an introduction to Cartan's approach to differential geometry. Two central methods in Cartan's geometry are the theory of exterior differential systems and the method of moving frames. This book presents thorough and modern treatments of both subjects, including their applications to both 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		₹ 760.00

Character Theory of Finite Groups

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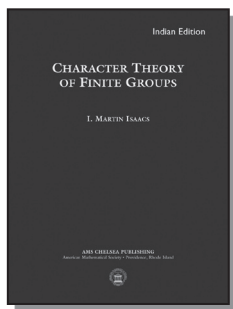
This volume contains a collection of papers from the Conference on Character Theory of Finite Groups, held at the Universitat de València, Spain, on June 3–5, 2009, in honor of I. Martin Isaacs.

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		₹ 720.00

Class Field Theory

Emil Artin & John Tate
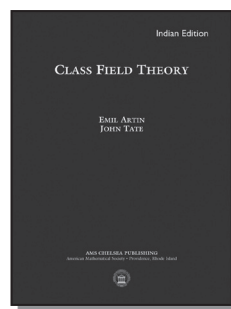
This classic book, originally published in 1968, is based on notes of a year-long seminar the authors ran at Princeton University. *The primary goal of the book was to give a rather complete presentation of algebraic aspects of global class field theory, and the authors accomplished this goal spectacularly:* 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		₹ 640.00

NEW

Classical and Quantum Computation

A Yu Kitaev, A H Shen & M N Vyalyi
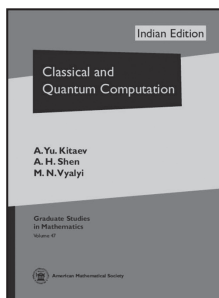
This book is an introduction to a new rapidly developing theory of quantum computing. It begins with the basics of classical theory of computation: Turing machines, Boolean circuits, parallel algorithms, probabilistic computation, NP-complete problems, and the idea of complexity of an algorithm. The 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		₹ 680.00

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

Stuart P Hastings
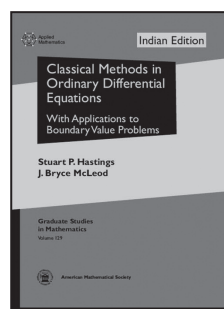
This text emphasizes rigorous mathematical techniques for the analysis of boundary value problems for ODEs arising in applications. The emphasis is on proving existence of solutions, but there is also a substantial chapter on uniqueness and multiplicity questions and several chapters

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 ⬦ Waźewski's principle, Conley index, and an n-dimensional lemma ⬦ Some boundary value problems for the Painlev´e transcendents ⬦ Periodic solutions of a higher order system ⬦ A global approach via the Brouwer fixed point theorem ⬦ A linear example ⬦ Homoclinic orbits of the FitzHugh-Nagumo equations ⬦ Existence of homoclinic orbits using geometric perturbation theory ⬦ Existence of homoclinic orbits by shooting ⬦ Singular perturbation problems—rigorous matching ⬦ Introduction to the method of matched asymptotic expansions ⬦ Asymptotics beyond all orders ⬦ Some solutions of the Falkner-Skan equation ⬦ Poiseuille flow: Perturbation and decay ⬦ Bending of a tapered rod; variational methods and shooting ⬦ A calculus of variations approach in Hilbert space ⬦ Uniqueness and multiplicity ⬦ Shooting with more parameters ⬦ Some problems of A. C. Lazer ⬦ Chaotic motion of a pendulum ⬦ Layers and spikes in reaction-diffusion equations, I ⬦ Uniform expansions for a class of second order problems ⬦ Layers and spikes

in reaction-diffusion equations, II ⬦ Three unsolved problems ⬦ Homoclinic orbit for the equation of a suspension bridge

| 2013 | 392 pp. | Paperback |
| 978-1-4704-0924-1 | | ₹ 760.00 |

Collected Papers of Srinivasa Ramanujan

G H Hardy, P V Seshu Aiyar & B M Wilson
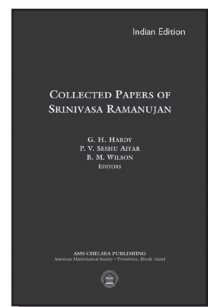
The influence of Ramanujan on number theory is without parallel in mathematics. His papers, problems, and letters have spawned a remarkable number of later results by many different mathematicians. Here, his 37 published papers, most of his first two and last letters to Hardy, the famous 58 problems submitted to the Journal of the Indian Mathematical Society, and the commentary of the original editors (Hardy, Seshu Aiyar and Wilson) are reprinted again, after having been unavailable for some time.

In this printing of Ramanujan's collected papers, Bruce Berndt provides an annotated guide to Ramanujan's work and to the mathematics it inspired over the last three-quarters of a century. The historical development of ideas is traced in the commentary and by citations to the copious references. The editor has done the mathematical world a tremendous service that few others would be qualified to do.

Contents: Some properties of Bernoulli's numbers ⬦ On Question 330 of Prof. Sanjana ⬦ Note on a set of simultaneous equations Irregular numbers ⬦ Squaring the circle ⬦ Modular equations and approximations to Π ⬦ On the integral ∫ x0tan−1t/t dt ⬦ On the number of divisors of a number On the sum of the square roots of the first n natural numbers ⬦ On the product Π n=∞n=0[1+(x/a+nd)3] ⬦ Some definite integrals ⬦ Some definite integrals connected with Gauss's sums ⬦ Summation of a certain series

◆ New expressions for Riemann's functions ξ (s) and Ξ(t) ◆ Highly composite numbers ◆ On certain infinite series ◆ Some formula in the analytic theory of numbers ◆ On certain arithmetical functions ◆ A series for Euler's constant γ ◆ On the expression of a number in the form $ax^2+by^2+cz^2+du^2$ ◆ On certain trigonometrical sums and their applications in the theory of numbers ◆ Some definite integrals ◆ A proof of Bertrand's postulate ◆ Some properties of p(n), the number of partitions of n ◆ Proof of certain identities in combinatory analysis ◆ A class of definite integrals ◆ Congruence properties of partitions ◆ Algebraic relations between certain infinite products ◆ Congruence properties of partitions ◆ Une formule asymptotique pour le nombre des partitions de n ◆ Proof that almost all numbers n are composed of about log log n prime factors ◆ Asymptotic formulae in combinatory analysis ◆ Asymptotic formulae for the distribution of integers of various types ◆ The normal number of prime factors of a number n ◆ Asymptotic formulae in combinatory analysis ◆ On the coefficients in the expansions of certain modular functions ◆ Questions and solutions ◆ *Appendix I: Notes on the papers* ◆ *Appendix II: Further extracts from Ramanujan's letters to G. H. Hardy* ◆ *Commentary on Ramanujan's collected papers*

2013	464 pp.	Paperback
978-1-4704-0918-0		₹ 800.00

Combinatorial Problems and Exercises:
(Second Edition)

László Lovász
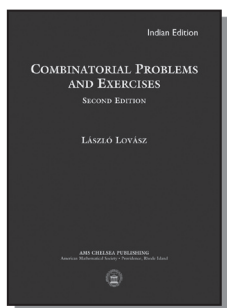
The main purpose of this book is to provide help in learning existing techniques in combinatorics. The most effective way of learning such techniques is to solve exercises and problems. This book presents all the material in the form of problems and series of problems (apart from some general comments 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		₹ 920.00

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

T W Körner
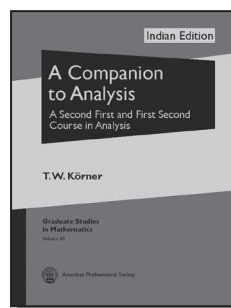
Many students acquire knowledge of a large number of theorems and methods of calculus without being able to say how they work together. This book provides those students with the coherent account that they need. *A Companion to Analysis explains the problems that must be resolved in order to procure 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		₹ 1,175.00

Complex Made Simple

David C Ullrich
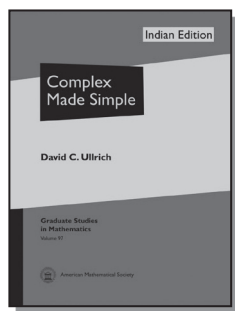
Perhaps uniquely among mathematical topics, complex analysis presents the student with the opportunity to learn a thoroughly developed subject that is rich in both theory and applications. Even in an introductory course, the theorems and techniques can have elegant formulations. But for any of these profound results, the student is often left asking: What does it really mean? Where does it come from?

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

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

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

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

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

Part 3: Appendices ◆ Complex numbers ◆ Complex numbers, continued Sin, cos and exp ◆ Metric spaces ◆ Convexity ◆ Four counter examples ◆ The Cauchy-

Riemann equations revisited ◆ *References* ◆ *Index of notations* ◆ *Index*

2012	489 pp.	Paperback
978-0-8218-8722-6		₹ 840.00

NEW

Complex Variables

Joseph L Taylor
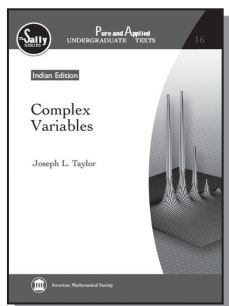
The text covers a broad spectrum between basic and advanced complex variables on the one hand and between theoretical and applied or computational material on the other hand. With careful selection of the *emphasis put on the various sections, examples, and exercises, the book can be used in a one- or 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		₹ 720.00

Computational Topology: An Introduction

Herbert Edelsbrunner & John L Harer
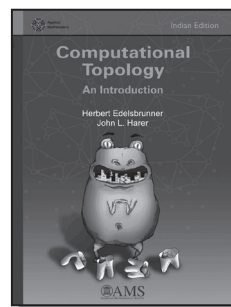
Combining concepts from topology and algorithms, this book delivers what its title promises: an introduction to the field of computational topology. Starting with motivating problems in both mathematics and computer science and building up from classic topics in geometric and algebraic topology, the 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		₹ 680.00

Concepts in Abstract Algebra

Charles Lanski

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		₹ 925.00

Course in Algebra, A

E B Vinberg

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		₹ 995.00

Course in Approximation Theory, A

Ward Cheney & Will Light
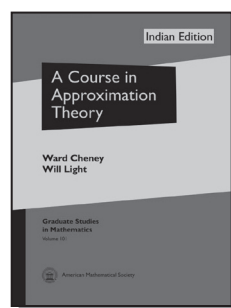
This textbook is designed for graduate students in mathematics, physics, engineering, and computer science. Its purpose is to guide the reader in exploring contemporary approximation theory. The emphasis is on multi-variable approximation theory, i.e., the approximation of functions in several variables, 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		₹ 760.00

NEW

Course in Operator Theory

John B Conway
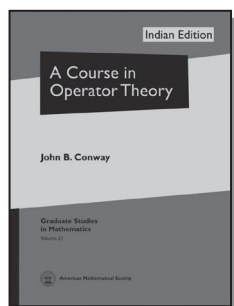
Operator theory is a significant part of many important areas of modern mathematics: functional analysis, differential equations, index theory, representation theory, mathematical

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		₹ 760.00

Cross Disciplinary Advances in Quantum Computing

Kazem Mahdavi, Deborah Koslover & Leonard L Brown III

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		₹ 640.00

Cryptography: An Introduction

V V Yaschenko
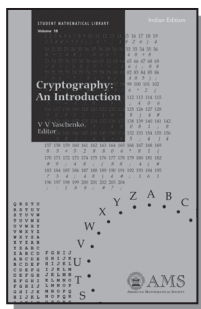
Learning about cryptography requires examining fundamental issues about information security. Questions abound, ranging from "From whom are we protecting ourselves?" and "How can we measure levels of security?" to "What are our opponent's capabilities?" and "What are their goals?" Answering these questions requires and understanding of basic cryptography. This book,

written by Russian cryptographers, explains those basics.

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

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

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

2009	240 pp.	Paperback
978-0-8218-4850-0		₹ 620.00

Curves and Surfaces
(Second Edition)

Sebastián Montiel & Antonio Ros

This introductory textbook puts forth a clear and focused point of view on the differential geometry of curves and surfaces. Following the modern point of view on differential geometry, the book emphasizes the global aspects of the subject. *The excellent collection of examples and exercises (with hints) will help students in learning the material. Advanced undergraduates and graduate students will find this a nice entry point to differential geometry*. In order to study the global properties of curves and surfaces, it is necessary to have more sophisticated tools than are usually found in textbooks on the topic. In particular, students must have a firm grasp on certain topological theories. Indeed, this monograph treats the Gauss-Bonnet theorem and discusses the Euler characteristic. The authors also cover Alexandrov's theorem on embedded compact surfaces in $\mathbf{R}^3$ 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		₹ 720.00

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

Zvezdelina Stankova & Tom Rike (Eds)
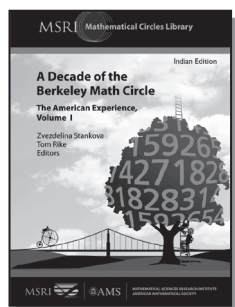
Many mathematicians have been drawn to mathematics through their experience with math circles: extracurricular programs exposing teenage students to advanced mathematical topics and a myriad of problem solving techniques and inspiring in them a lifelong love for mathematics. Founded in 1998, the *Berkeley 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 Part I ❖ Combinatorics. Part I ❖ Rubik's cube. Part I ❖ Number theory Part I ❖ A few words about proofs. Part I ❖ Mathematical induction ❖ Mass point geometry ❖ More on proofs. Part II ❖ Complex numbers. Part I ❖ Stomp. Games with invariants ❖ Favorite problems at BMC. Part I ❖ Monovariants. Part I ❖ *Epilogue* ❖ *Symbols and notation* ❖ *Abbreviations* ❖ *Biographical data* ❖ *Bibliography* ❖ *Credits* ❖ *Index*

2012	326 pp.	Paperback
978-0-8218-8728-8		₹ 720.00

Differential Equations, Mechanics, and Computation

Richard S. Palais & Robert A. Palais

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	313 pp.	Paperback
978-0-8218-8735-6		₹ 720.00

Differential Geometry, Lie Groups, and Symmetric Spaces

Sigurdur Helgason

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

Helgason begins with a concise, self-contained introduction to differential geometry. He then introduces Lie groups and Lie algebras, including

important results on their structure. This sets the stage for the introduction and study of symmetric spaces, which form the central part of the book. The text concludes with the classification of symmetric spaces by means of the Killing-Cartan classification of simple Lie algebras over C and Cartan's classification of simple Lie algebras over R.

The excellent exposition is supplemented by extensive collections of useful exercises at the end of each chapter. All the problems have either solutions or substantial hints, found at the back of the book. For this latest edition, Helgason has made corrections and added helpful notes and useful references.

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

2010	668 pp.	Paperback
978-0-8218-5217-0		₹ 1195.00

NEW

Elements of Combinatorial and Differential Topology

V. V. Prasolov
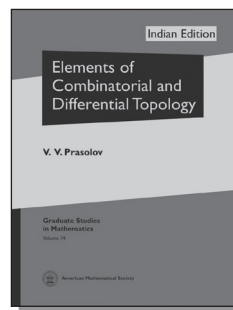
Modern topology uses very diverse methods. This book is devoted largely to methods of combinatorial topology, which reduce the study of topological spaces to investigations of their partitions into elementary sets, and to methods of differential topology, which deal with smooth manifolds and smooth maps. 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
97-81-4704-1915-8		₹ 720.00

Elementary Topology: Problem Textbook

O Ya Viro, O A Ivanov, N Yu Netsvetaev & V M Kharlamov
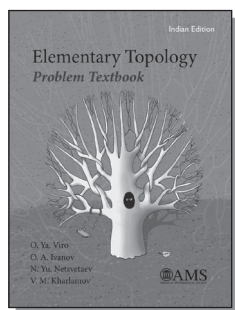
This textbook on elementary topology contains a detailed introduction to general topology and an introduction to algebraic topology via its most classical and elementary segment centered at the notions of fundamental group and covering space.

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		₹ 800.00

Enumerative Geometry and String Theory

Sheldon Katz

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		₹ 640.00

Famous Puzzles of Great Mathematicians

Miodrag S Petković

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		₹ 720.00

Finite Fields and Applications

Gary L Mullen & Carl Mummert
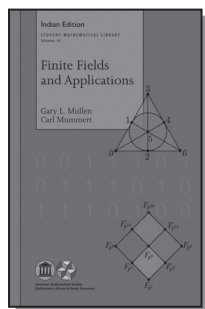
This book provides a brief and accessible introduction to the theory of finite fields and to some of their many fascinating and practical applications.

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		₹ 640.00

Finite Group Theory

I Martin Isaacs
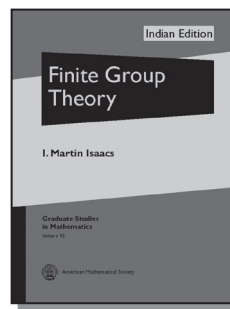
The text begins with a review of group actions and Sylow theory. It includes semidirect products, the Schur-Zassenhaus theorem, the theory of commutators, coprime actions on groups, transfer theory, Frobenius groups, primitive and multiply transitive permutation groups, the simplicity of the PSL groups, 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		₹ 755.00

First Course in Topology, A: Continuity and Dimension

John McCleary

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		₹ 475.00

Foundations of Mechanics
(Second Edition)

Ralph Abraham & Jerrold E. Marsden

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		₹ 1,375.00

NEW

Fourier Analysis

Javier Duoandikoetxea

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

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

Chapter 1 presents a review of Fourier series and integrals; *Chapters 2* and *3* introduce two operators that are basic to the field: the Hardy-Littlewood maximal function and the Hilbert transform. *Chapters 4* and *5* discuss singular integrals, including modern generalizations. *Chapter 6* studies the relationship between H1, BMO, and singular integrals; *Chapter 7* presents

the elementary theory of weighted norm inequalities. *Chapter 8* discusses Littlewood-Paley theory, which had developments that resulted in a number of applications. The *final chapter* concludes with an important result, the T1 theorem, which has been of crucial importance in the field.

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

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

2013	240 pp.	Paperback
978-1-4704-0926-5		₹ 640.00

Fourier Analysis and Its Applications

Gerald B. Folland
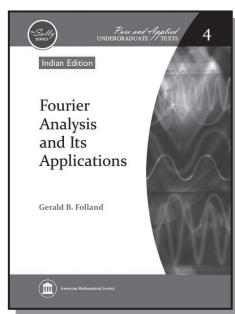
This book presents the theory and applications of Fourier series and integrals, eigenfunction expansions, and related topics, on a level suitable for advanced undergraduates. It includes material on Bessel functions, orthogonal polynomials, and Laplace transforms, and it concludes with chapters on generalized 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		₹ 970.00

Function Theory of One Complex Variable
(Third Edition)

Robert E Greene & Steven G Krantz

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		₹ 895.00

Functional Analysis: An Introduction

Yuli Eidelman , Vitali Milman & Antonis Tsolomitis
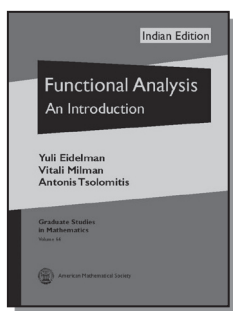
This textbook provides an introduction to the methods and language of functional analysis, including Hilbert spaces, Fredholm theory for compact operators, and spectral theory of self-adjoint operators. It also presents the basic theorems and methods of abstract functional analysis and a few applications 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		₹ 755.00

Gentle Introduction to Game Theory, A

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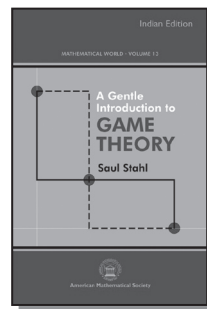
The mathematical theory of games was first developed as a model for situations of conflict, whether actual or recreational. It gained widespread recognition when it was applied to the theoretical study of economics by von Neumann and Morgenstern in Theory of Games and Economic Behavior in the 1940s.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

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

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

2012	176 pp.	Paperback
978-0-8218-9182-7		₹ 640.00

Geometric Analysis on Symmetric Spaces

Sigurdur Helgason

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

Analysis. Containing exercises (with solutions) and references to further results, this revised edition would be suitable for advanced graduate courses in modern integral geometry, analysis on Lie groups, and representation theory of Lie groups.

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

2011	656 pp.	Paperback
978-0-8218-6895-9		₹ 995.00

Geometry for College Students

I Martin Isaacs
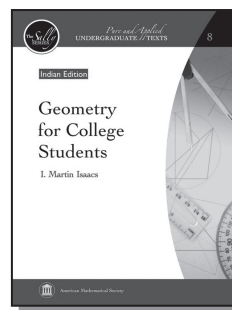
One of the challenges many mathematics students face occurs after they complete their study of basic calculus and linear algebra, and they start taking courses where they are expected to write proofs. Historically, students have been learning to think mathematically and to write proofs by studying Euclidean geometry. *In the author's opinion, geometry is still the best way to make the transition from elementary to advanced mathematics.*

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

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

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

2012	222 pp.	Paperback
978-0-8218-8706-6		₹ 640.00

Geometry of Differential Forms

Shigeyuki Morita

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

Contents: Manifolds ◆ Differential forms ◆ de Rham theorem ◆ Laplacian and harmonic forms ◆ Vector

bundles and characteristic classes ◆ Fiber bundles and characteristic classes ◆ *Perspectives* ◆ *Solutions* ◆ *References* ◆ *Index*

2009	352 pp.	Paperback
978-0-8218-4852-4		₹ 740.00

Global Calculus

S Ramanan

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		₹ 700.00

Graduate Algebra: Commutative View

Louis Halle Rowen

This book is an expanded text for a graduate course in commutative algebra, focusing on the algebraic underpinnings of algebraic geometry and of number theory. Accordingly, the theory of affine algebras

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

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

2010	456 pp.	Paperback
978-0-8218-5220-0		₹ 975.00

Hamilton's Ricci Flow

Bennett Chow, Peng Lu & Lei Ni

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		₹ 1195.00

Introduction to Analysis
(Fifth Edition)

Edward D Gaughan

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 | | ₹ 595.00 |

NEW

Introduction to Complex Analysis
(Second Edition)

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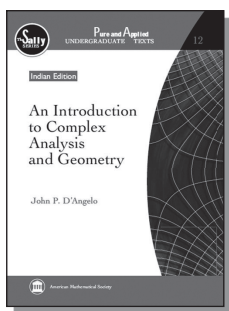
It really is a gem, both in terms of its table of contents and the level of discussion. The exercises also look very good. —*Clifford Earle, Cornell University*

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

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

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

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

2012	352 pp.	Paperback
978-0-8218-9179-7		₹ 760.00

Introduction to Complex Analysis & Geometry, An

John D'Angelo
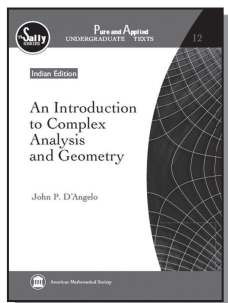
An Introduction to Complex Analysis and Geometry provides the reader with a deep appreciation of complex analysis and how this subject fits into mathematics. The book developed from courses given in the Campus Honors Program at the University of Illinois Urbana-Champaign. These courses aimed to share 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		₹ 640.00

Introduction to Differential Equations

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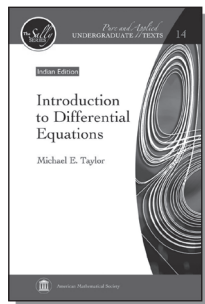
The mathematical formulations of problems in physics, economics, biology, and other sciences are usually embodied in differential equations. The analysis of the resulting equations then provides new insight into the original problems. This book describes the tools for performing that analysis.

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		₹ 720.00

Introduction to Fourier Analysis and Wavelets

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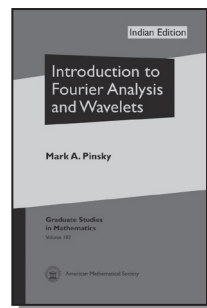
This book provides a concrete introduction to a number of topics in harmonic analysis, accessible at the early graduate level or, in some cases, at an upper undergraduate level. Necessary prerequisites to using the text are rudiments of the Lebesgue measure and integration on the real line. *It begins*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

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

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

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

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

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

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

2012	376 pp.	Paperback
978-0-8218-8712-7		₹ 760.00

NEW

Introduction to Game-Theoretic Modelling (Second Edition)

Mike Mesterton-Gibbons
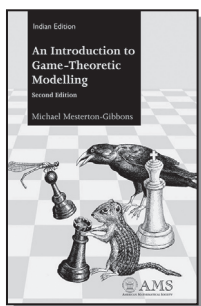
This book is about using game theory in mathematical modelling. It is an introductory text, covering the basic ideas and methods of game theory as well as the necessary ideas from the vast spectrum of scientific study where the methods are applied. It has by now become generally apparent that game theory 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		₹ 760.00

Introduction to Gröbner Bases, An

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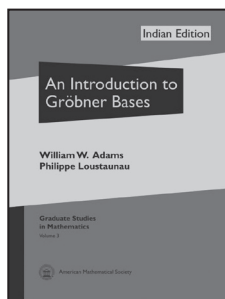
As the primary tool for doing explicit computations in polynomial rings in many variables, Gröbner bases are an important component of all computer algebra systems. They are also important in computational commutative algebra and algebraic geometry. *This book provides a leisurely and fairly comprehensive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

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

2012	289 pp.	Paperback
978-0-8218-8715-8		₹ 720.00

NEW

Introduction to Measure Theory, An

Terence Tao
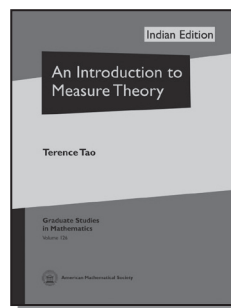
This is a graduate text introducing the fundamentals of measure theory and integration theory, which is the foundation of modern real analysis. The text focuses first on the concrete setting of Lebesgue measure and the Lebesgue integral (which in turn is motivated by the more classical concepts of Jordan 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		₹ 640.00

Introduction to the Mathematical Theory of Waves, An

Roger Knobel
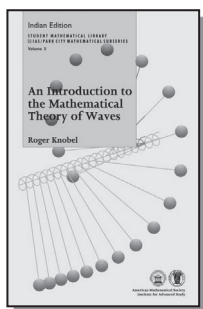
This book is based on an undergraduate course taught at the IAS/Park City Mathematics Institute (Utah) on linear and nonlinear waves. *The first part of the text* overviews the concept of a wave, describes one-dimensional waves using functions of two variables, provides an introduction to partial differential 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		₹ 640.00

Introduction to the Mathematics of Finance

R J Williams
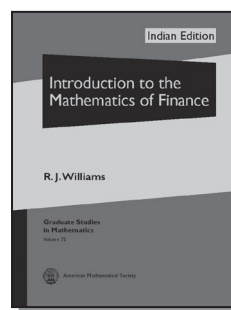
The modern subject of mathematical finance has undergone considerable development, both in theory and practice, since the seminal work of Black and Scholes appeared a third of a century ago. This book is intended as an introduction to some elements of the theory that will enable students and researchers to go on to read more advanced texts and research papers. The book begins with the development of the basic ideas of hedging and pricing of European and American derivatives in the discrete (i.e., discrete time and discrete state) setting of binomial tree models. Then a general discrete

finite market model is introduced, and the fundamental theorems of asset pricing are proved in this setting. Tools from probability such as conditional expectation, filtration, (super) martingale, equivalent martingale measure, and martingale representation are all used first in this simple discrete framework. This provides a bridge to the continuous (time and state) setting, which requires the additional concepts of Brownian motion and stochastic calculus. *The simplest model in the continuous setting is the famous Black-Scholes model, for which pricing and hedging of European and American derivatives are developed. The book concludes with a description of the fundamental theorems for a continuous market model that generalizes the simple Black-Scholes model in several directions.*

Contents: Financial Markets and Derivatives ❖ Binomial Model ❖ Finite Market Model ❖ Black-Scholes Model ❖ Multi-dimensional Black-Scholes Model ❖ *Appendix A: Conditional Expectation and Lp-Spaces* ❖ *Appendix B: Discrete Time Stochastic Processes* ❖ *Appendix C: Continuous Time Stochastic Processes* ❖ *Appendix D: Brownian Motion and Stochastic Integration* ❖ *Bibliography* ❖ *Index*

2011	160 pp.	Paperback
978-0-8218-6882-9		₹ 465.00

NEW

Introduction to Representation Theory

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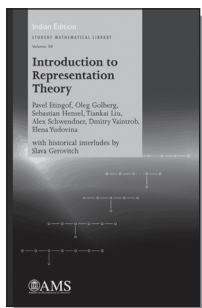
Very roughly speaking, representation theory studies symmetry in linear spaces. It is a beautiful mathematical subject which has many applications, ranging from number theory and combinatorics to geometry, probability theory, quantum mechanics, and quantum field theory.

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
97-81-4704-1919-6		₹ 640.00

Introduction to Probability
(Second Edition)

Charles M Grinstead & J Laurie Snell

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 | | ₹ 1020.00 |

Introductory Course on Mathematical Game Theory, An

Julio González-Díaz, Ignacio García-Jurado & M Gloria Fiestras-Janeiro
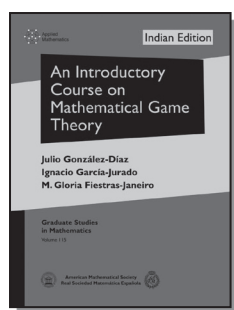
Game theory provides a mathematical setting for analyzing competition and cooperation in interactive situations. The theory has been famously applied in economics, but is relevant in many other sciences, such as political science, biology, and, more recently, computer science. This book presents an introductory 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		₹ 720.00

Invitation to Ergodic Theory

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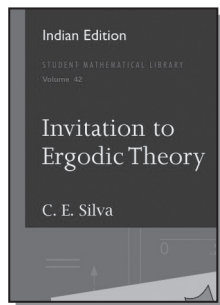
This book is an introduction to basic concepts in ergodic theory such as recurrence, ergodicity, the ergodic theorem, mixing, and weak mixing. It does not assume knowledge of measure theory; all the results needed from measure theory are presented from scratch. In particular, the book includes a detailed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

Several examples of a dynamical system are developed in detail to illustrate various dynamical concepts. These include in particular the baker's transformation, irrational rotations, the dyadic odometer, the Hajian-Kakutani transformation, the Gauss transformation, and the Chacón transformation. There is a detailed discussion of cutting and stacking transformations in ergodic

theory. The book includes several exercises and some open questions to give the flavor of current research. The book also introduces some notions from topological dynamics, such as minimality, transitivity and symbolic spaces; and develops some metric topology, including the Baire category theorem.

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

2012	262 pp.	Paperback
978-0-8218-8733-2		₹ 680.00

Knot Book, The: An Elementary Introduction to the Mathematical Theory of Knots

Colin C. Adams
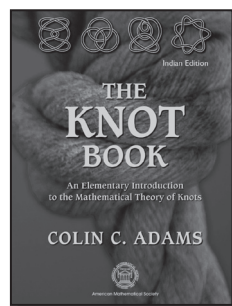
Knots are familiar objects. We use them to moor our boats, to wrap our packages, to tie our shoes. Yet the mathematical theory of knots quickly leads to deep results in topology and geometry. *The Knot Book* is an introduction to this rich theory, starting with our familiar understanding of knots and 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		₹ 720.00

Linear Algebra in Action

Harry Dym
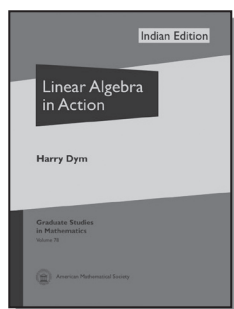
Linear algebra permeates mathematics, perhaps more so than any other single subject. It plays an essential role in pure and applied mathematics, statistics, computer science, and many aspects of physics and engineering. *This book conveys in a user-friendly way the basic and advanced techniques of linear 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		₹ 840.00

Manifolds and Differential Geometry

Jeffrey M Lee
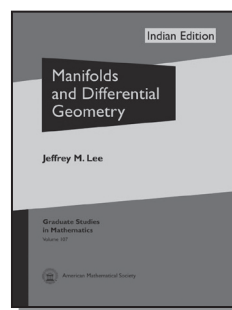
Differential geometry began as the study of curves and surfaces using the methods of calculus. In time, the notions of curve and surface were generalized along with associated notions such as length, volume, and curvature. At the same time the topic has become closely

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		₹ 920.00

Mapping Degree Theory

Enrique Outerelo & Jesús M. Ruiz

This textbook treats the classical parts of mapping degree theory, with a detailed account of its history traced back to the first half of the 18th century. After a historical first chapter, the remaining four chapters develop the mathematics. An effort is made to use only elementary methods, resulting in a self-contained presentation. Even so, the book arrives at some truly outstanding theorems: the classification of homotopy classes for spheres and the Poincaré-Hopf Index Theorem, as well as the proofs of the original formulations by Cauchy, Poincaré, and others.

Although the mapping degree theory you will discover in this book is a classical subject, the treatment is refreshing for its simple and direct style. The straightforward exposition is accented by the appearance of several uncommon topics: tubular neighborhoods without metrics, differences between class 1 and class 2 mappings, Jordan Separation with neither compactness nor cohomology, explicit constructions of homotopy classes of spheres, and the direct computation of the Hopf invariant of the first Hopf fibration.

The book is suitable for a one-semester graduate course. There are 180 exercises and problems of different scope and difficulty.

Contents: *Preface* ❖ History ❖ Manifolds ❖ The Brouwer-Kronecker degree ❖ Degree theory in Euclidean spaces ❖ The Hopf Theorems ❖ Names of mathematicians cited ❖ Historical references ❖ *Bibliography* ❖ *Symbols* ❖ *Index*

2012	244 pp.	Paperback
978-0-8218-8714-1		₹ 680.00

Mathematical Modelling: A Case Studies Approach

Reinhard Illner, C Sean Bohun, Samantha McCollum & Thea Van Roode
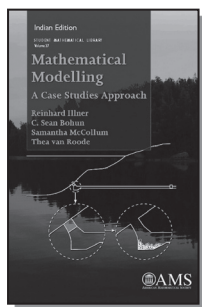
Mathematical Modelling is a subject without boundaries. It is the means by which mathematics becomes useful to virtually any subject. Moreover, modelling has been and continues to be a driving force for the development of mathematics itself. *This book explains the process of modelling real situations 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		₹ 450.00

Mathematical Omnibus: Thirty Lectures on Classic Mathematics

Dmitry Fuchs & Serge Tabachnikov

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		₹ 895.00

Mathematics of Finance, The: Modeling and Hedging

Victor Goodman and Joseph Stampfli
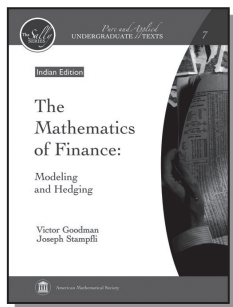
This book is ideally suited for an introductory undergraduate course on financial engineering. It explains the basic concepts of financial derivatives, including put and call options, as well as more complex derivatives such as barrier options and options on futures contracts. Both discrete and continuous 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		₹ 680.00

Mathematics of Financial Obligations

A V Mel'nikov, S N Volkov & M L Nechaev
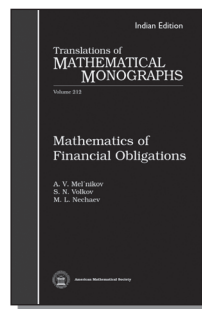
Contemporary finance and actuarial calculations have become so mathematically complex that a rigorous exposition is required for an accurate and complete presentation. This volume delivers just that. It gives a comprehensive and up-to-date methodology for financial pricing and modelling. Also included 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		₹ 640.00

Matrix Groups for Undergraduates

Kristopher Tapp

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		₹ 450.00

Measure and Integration

Sterling K Berberian
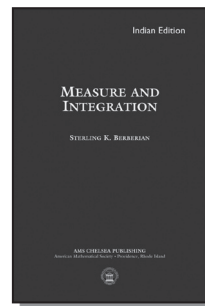
This highly flexible text is organized into two parts: Part I is suitable for a one-semester course at the first-year graduate level, and the book as a whole is suitable for a full-year course.

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		₹ 720.00

Measure Theory and Integration

Michael E Taylor
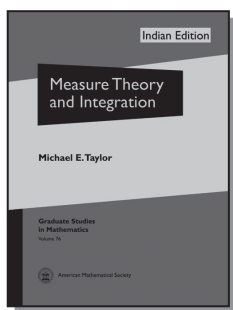
This self-contained treatment of measure and integration begins with a brief review of the Riemann integral and proceeds to a construction of Lebesgue measure on the real line. From there the reader is led to the general notion of measure, to the construction of the Lebesgue integral on a measure space, and to the major limit theorems, such as the Monotone and Dominated Convergence Theorems. The treatment proceeds to Lp spaces, normed linear spaces that are shown to be complete (i.e., Banach spaces) due to the limit theorems. Particular attention is paid to L2 spaces as Hilbert spaces, with a useful geometrical structure.

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

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

Contents: The Riemann integral ◆ Lebesgue measure on the line ◆ Integration on measure spaces ◆ Lp spaces ◆ The Caratheodory construction of measures ◆ Product measures ◆ Lebesgue measure on Rn and on manifolds ◆ Signed measures and complex measures Lp spaces, II ◆ Sobolev spaces ◆ Maximal functions and a.e. phenomena ◆ Hausdorff's r-dimensional measures ◆ Radon measures ◆ Ergodic theory ◆ Probability spaces and random variables ◆ Wiener measure and Brownian motion ◆ Conditional expectation and martingales ◆ *Appendix A: Metric spaces, topological spaces, and compactness* ◆ *Appendix B: Derivatives, diffeomorphisms, and manifolds* ◆ *Appendix C: The Whitney Extension Theorem* ◆ *Appendix D: The Marcinkiewicz Interpolation Theorem* ◆ *Appendix E: Sard's Theorem* ◆ *Appendix F: A change of variable theorem for many-to-one maps* ◆ *Appendix G: Integration of differential forms* ◆ *Appendix H: Change of variables revisited* ◆ *Appendix I: The Gauss-Green formula on Lipschitz domains* ◆ *Bibliography* ◆ *Symbol index* ◆ *Subject index*

2012	319 pp.	Paperback
978-0-8218-8718-9		₹ 720.00

Models of Conflict and Co-operation

Rick Gillman & David Housman
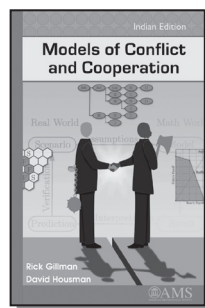
Models of Conflict and Cooperation is a comprehensive, introductory, game theory

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		₹ 800.00

Modern Theory of Integration, A

Robert G Bartle

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		₹ 895.00

Solutions Manual to a Modern Theory of Intgration

2010	80 pp.	Paperback
978-0-8218-5216-3		₹ 450.00

Number Theory

V Kumar Murty & Michel Waldschmidt

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		₹ 750.00

Arithmetic Algebraic Geometry

- Relative splitting of one-motives
- The Hasse principle in a pencil of algebraic varieties
- Stark-Heegner points over real quadratic fields
- On the Hecke action on the cohomology of Hilbert-Blumenthal surfaces
- The ABC conjecture and exponents of class groups of quadratic fields
- Heights of points on subvarieties of $\mathbf{G}_m^n$
- A note on a geometric analogue of Ankeny-Artin-Chowla's conjecture

Automorphic Forms

- Determinant of representations of division algebras of prime degree over local fields
- Mod p modular forms
- On exceptions of integral quadratic forms
- A brief survey on the theta correspondence
- Deformations of Siegel-Hilbert Hecke eigensystems and their Galois representations

Elementary and Analytic Number Theory

- A new key identity for Göllnitz' (Big) partition theorem
- Some local-convexity theorems for the zeta-function-like analytic functions--III
- Perfect powers in products of terms in an arithmetical progression IV
- On some connections between probability and number theory
- Inhomogeneous minima of a class of quaternary quadratic forms of type (2,2)
- On an arithmetical inequality, II
- Transcendental Number Theory
- Algebraic numbers close to 1: results and methods
- Transcendence in positive characteristic
- Minorations des hauteurs normalisées des sous-variétés de variétés abéliennes
- Klein polygons and geometric diagrams
- Sails and Klein polyhedra
- Automata and transcendence

Number Theory in the Spirit of Ramanujan

Bruce C Berndt
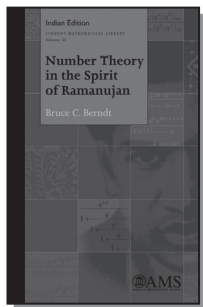
Ramanujan is recognized as one of the great number theorists of the twentieth century. Here now is the first book to provide an introduction to his work in number theory. Most of Ramanujan's work in number theory arose out of q-series and theta functions. This book provides an introduction to these two 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		₹ 640.00

Numerical Analysis: Mathematics of Scientific Computing
(Third Edition)

David Kincaid & Ward Cheney
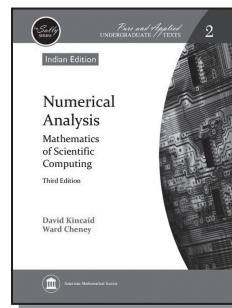
This book introduces students with diverse backgrounds to various types of mathematical analysis that are commonly needed in scientific computing. The subject of numerical analysis is treated from a mathematical point of view, offering a complete analysis of methods for scientific computing with appropriate motivations and careful proofs.

In an engaging and informal style, the authors demonstrate that many computational procedures and intriguing questions of computer science arise from theorems and proofs. *Algorithms are presented in pseudo code, so that students can immediately write computer programs in standard languages or use interactive mathematical software packages*.

Contents: Mathematical ❖ Preliminaries ❖ Computer Arithnetic ❖ Solution of Nonlinear Equations ❖ Solving Systems of Linear Equations ❖ Selected Topics in Numerical Linear Algebra ❖ Approximating Functions ❖ Numerical Differentiation and Integration ❖ Numerical Solution of Ordinary Differential Equations ❖ Numerical Solution of Partial Differential Equations ❖ Linear Programming and Related Topics ❖ Optimization ❖ *Appendix A: An Overview of Mathematical Software* ❖ *Bibliography* ❖ *Index*

2010	788 pp.	Paperback
978-0-8218-5207-1		₹ 1375.00

p-adic Analysis Compared with Real

Svetlana Katok

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

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

Contents: Arithmetic of the p-adic Numbers ⬦ The Topology of Qg vs. the Topology of R ⬦ Elementary Analysis in Qp ⬦ p-adic Functions ⬦ Answers, Hints, and Solutions for Selected Exercises ⬦ *Bibliography* ⬦ *Index*

2010	168 pp.	Paperback
978-0-8218-5224-8		₹ 475.00

Partial Differential Equations
(Second Edition)

Lawrence C. Evans
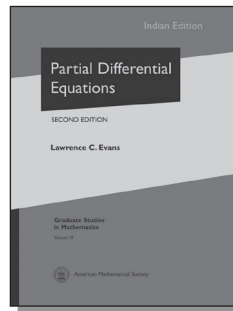
This is the second edition of the now definitive text on partial differential equations (PDE). It offers a comprehensive survey of modern techniques in the theoretical study of PDE with particular emphasis on nonlinear equations. Its wide scope and clear exposition make it a great text for a graduate 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
97-81-4704-1497-9		₹ 995.00

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

Mark A Pinsky
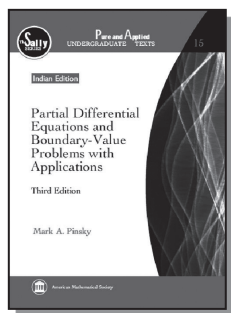
Building on the basic techniques of separation of variables and Fourier series, the book presents the solution of boundary-value problems for basic partial differential equations: the heat equation, wave equation, and Laplace equation, considered in various standard coordinate systems--rectangular, cylindrical, 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		₹ 840.00

NEW

Prime Numbers and Their Distribution, The

Gérald Tenenbaum and Michel Mendès France
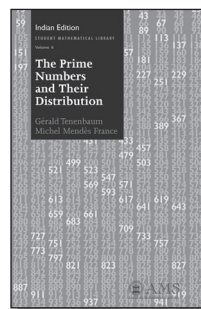
We have been curious about numbers–and prime numbers--since antiquity. One notable new direction this century in the study of primes has been the influx of ideas from probability. The goal of this book is to provide insights into the prime numbers and to describe how a sequence so tautly determined can 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
97-81-4704-1917-2		₹ 640.00

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

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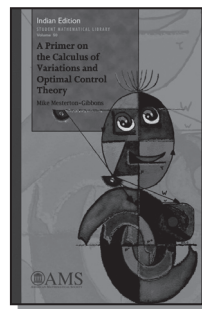
The calculus of variations is used to find functions that optimize quantities expressed in terms of integrals. Optimal control theory seeks to find functions that minimize cost integrals for systems described by differential equations.

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

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

Contents: The Brachistochrone ❖ The fundamental problem Extremals ❖ The insufficiency of extremality ❖ Important first integrals ❖ The du Bois-Reymond equation ❖ The corner conditions ❖ Legendre's necessary condition ❖ Jacobi's necessary condition ❖ Weak versus strong variations ❖ Weierstrass's necessary condition ❖ The transversality conditions ❖ Hilbert's invariant integral ❖ The fundamental

sufficient condition ❖ Jacobi's condition revisited ❖ Isoperimetrical problems ❖ Optimal control problems ❖ Necessary conditions for optimality ❖ Time-optional control ❖ A singular control problem ❖ A biological control problem ❖ Optimal control to a general target ❖ Navigational control problems ❖ State variable restrictions ❖ Optimal harvesting ❖ Afterword ❖ Solutions or hints for selected exercises ❖ *Bibliography* ❖ *Index*

2012	252 pp.	Paperback
978-0-8218-8734-9		₹ 680.00

Principles of Functional Analysis
(Second Edition)

Martin Schechter

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		₹ 760.00

Probability

Davar Khoshnevisan
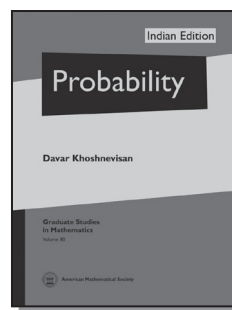
This is a textbook for a one-semester graduate course in measure-theoretic probability theory, but with ample material to cover an ordinary year-long course at a more leisurely pace. *Khoshnevisan's* approach is to develop the ideas that are absolutely central to modern probability theory, and to showcase 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		₹ 640.00

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

Michael A Bean
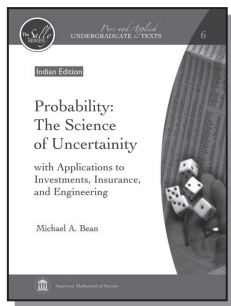
This book covers the basic probability of distributions with an emphasis on applications from the areas of investments, insurance, and engineering. Written by a Fellow of the Casualty Actuarial Society and the Society of Actuaries with many years of experience as a university professor and industry practitioner, 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 TM. The book includes a large number of problems of varying difficulty. A student manual with solutions to selected problems is available electronically from the 'Solutions Manual' link above. An instructor''s manual for this title is available electronically. Please send email to textbooks@ams.org for more information.

Contents: *Introduction* ◆ A Survey of Some Basic ◆ Concepts Through Examples ◆ Classical Probability ◆ Random Variables and Probability Distributions ◆ Special Discrete Distributions ◆ Special Continuous ◆ Distributions ◆ Transformations of Random Variables ◆ Sums and Products of Random Variables Mixtures and Compound Distributions ◆ The Markowitz ◆ Investment Portfolio Selection Model ◆ *Appendixes* ◆ *Answers to Selected Exercises* ◆ *Index*

2012	448 pp.	Paperback
978-0-8218-9177-3		₹ 800.00

NEW

Probability Theory

S. R. S. Varadhan
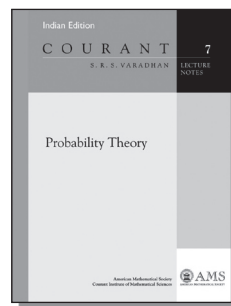
S. R. S. Varadhan is recognized as a top expert in probability theory. This volume presents topics in probability theory covered during a first-year graduate course given by Varadhan at the Courant Institute of Mathematical Sciences. The necessary background material in measure theory is developed, including 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
97-81-4704-1914-1		₹ 640.00

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

Seán Dineen
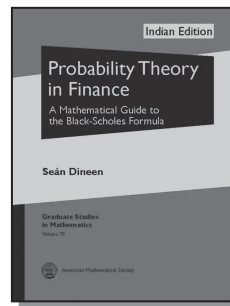
The use of the Black-Scholes model and formula is pervasive in financial markets. *There are very few undergraduate textbooks available on the subject and, until now, almost none written by mathematicians.*

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		₹ 755.00

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

W J Kaczor & M T Nowak

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	380 pp.	Paperback
978-0-8218-4854-8		₹ 780.00

Problems in Mathematical Analysis II: Continuity and Differentiation

W J Kaczor & M T Nowak

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

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

2009	416 pp.	Paperback
978-0-8218-4855-5		₹ 780.00

Problems in Mathematical Analysis III: Integration

W J Kaczor & M T Nowak

The best way to penetrate the subtleties of the theory of integration is by solving problems. This book, like its two predecessors, is a wonderful source of interesting and challenging problems. As a resource, it is unequaled. *It offers a much richer selection than is found in any current textbook. Moreover, the book includes a complete set of solutions. This is the third volume of Problems in Mathematical Analysis*. The topic here is integration for real functions of one real variable. The *first chapter* is devoted to the Riemann and the Riemann – Stieltjes integrals. *Chapter 2* deals with Lebesgue measure and integration.

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

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

2009	368 pp.	Paperback
978-0-8218-4853-1		₹ 740.00

Problems in Operator Theory

Y A Abramovich & C D Aliprantis

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		₹ 800.00

Real Analysis

Frank Morgan

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

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

Contents: *Part I:* Real numbers and limits ◆ Numbers and logic ◆ Infinity ◆ Sequences ◆ Functions and limits ◆ *Part II:* Topology ◆ Open and closed sets ◆

Continuous functions ◆ Composition of functions ◆ Subsequences ◆ Compactness ◆ Existence of maximum ◆ Uniform continuity ◆ Connected sets and the intermediate value theorem ◆ The Cantor set and fractals ◆ *Part III:* Calculus ◆ The derivative and the mean value theorem ◆ The Riemann integral ◆ The fundamental theorem of calculus ◆ Sequences of functions ◆ The Lebesgue theory ◆ Infinite series Σ a to n ◆ Absolute convergence ◆ Power series ◆ Fourier series ◆ Strings and springs ◆ Convergence of Fourier series ◆ The exponential function ◆ Volumes of n-balls and the gamma function ◆ *Part IV:* Metric spaces ◆ Metric spaces ◆ Analysis on metric spaces ◆ Compactness in metric spaces ◆ Ascoli's theorem ◆ Partial solutions to exercises ◆ *Greek letters* ◆ *Index*

| 2010 | 160 pp. | Paperback |
| 978-0-8218-5222-4 | | ₹ 550.00 |

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

Frank Morgan
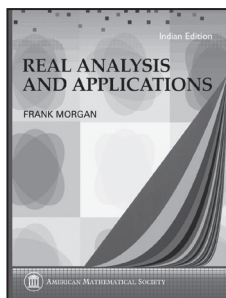
Real Analysis and Applications starts with a streamlined, but complete, approach to real analysis. It finishes with a wide variety of applications in Fourier series and the calculus of variations, including minimal surfaces, physics, economics, Riemannian geometry, and general relativity. The basic theory 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 | | ₹ 640.00 |

Representation Theory and Automorphic Forms

Paul J Sally, Jr. & Nolan R Wallach (Eds)

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

Contents: On the characters of a semisimple Lie group ◆ Infinite-dimensional group representations ◆ Translation-invariant cones of functions on semi-simple Lie groups ◆ On the existence and irreducibility of certain series of representations ◆ The action of a real semisimple group on a complex flag manifold. I: Orbit structure and holomorphic arc components ◆ Harmonic analysis on semisimple Lie groups ◆ On the Selberg trace formula in the case of

compact quotient ⬥ Invariant differential equations on homogeneous manifolds ⬥ On the role of the Heisenberg group in harmonic analysis ⬥ Ergodic theory, group representations, and rigidity ⬥ An elementary introduction to the Langlands program

2010	448 pp.	Paperback
978-0-8218-5211-8		₹ 950.00

Representations of Finite and Compact Groups

Barry Simon

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

Contents: *Preface* ⬥ Chapters VIII, VII, and III ⬥ Fundamentals of group represetnations (Chapter 2) ⬥ Introduction ⬥ Groups and counting principles (Chapter I) ⬥ Fundamentals of group representations (Chapter II) ⬥ Abstract theory of representations of finite groups (Chapter III) ⬥ Representations of concrete finite groups. I: Abelian and Clifford groups (Chapter IV) ⬥ Representations of concrete finite groups. II: Semidirect products and induced representations (Chapter V) ⬥ Concrete

representations of finite groups. III: The symmetric groups (Chapter VI) ⬥ Compact groups (Chapter VII) ⬥ The structure of compact semisimple groups (Chapter VIII) ⬥ The representations of compact semisimple groups (Chapter IX) ⬥ Multilinear algebra (Appendix A) ⬥ The analysis of self-adjoint Hilbert-Schmidt operators (Appendix B) ⬥ *Bibliography* ⬥ *Index*

2009	266 pp.	Paperback
978-0-8218-4851-7		₹ 660.00

Roots to Research: A Vertical Development of Mathematical Problems

Judith D Sally & Paul J Sally, Jr.
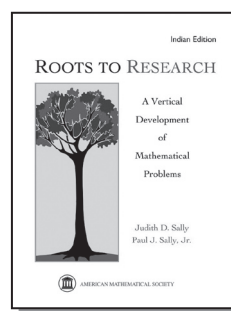
Certain contemporary mathematical problems are of particular interest to teachers and students because their origin lies in mathematics covered in the elementary school curriculum and their development can be traced through high school, college, and university level mathematics. This book is intended 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		₹ 760.00

NEW

Tensors: Geometry and Applications

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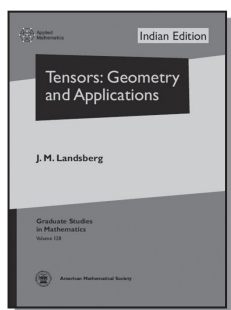
Tensors are ubiquitous in the sciences. The geometry of tensors is both a powerful tool for extracting information from data sets, and a beautiful subject in its own right. *This book has three intended uses: a classroom textbook, a reference work for researchers in the sciences, and an account of classical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

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

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

2013	464 pp.	Paperback
978-1-4704-0923-4		₹ 800.00

Theory of Matrices, The
(Volume 1)

F R Gantmacher
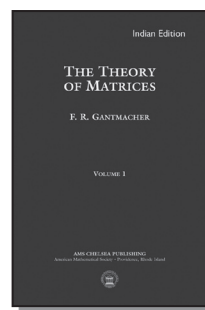
This treatise, by one of Russia's leading mathematicians, gives in easily accessible form a coherent account of matrix theory with a view to *applications in mathematics, theoretical physics, statistics, electrical engineering, etc. The individual chapters have been kept as far as possible independent 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		₹ 760.00

Theory of Matrices, The
(Volume 2)

F R Gantmacher
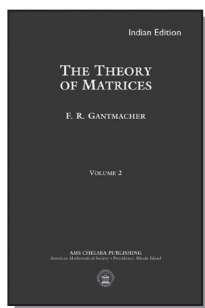
This treatise, by one of Russia's leading mathematicians, gives in easily accessible form a coherent account of matrix theory with a view to applications in mathematics, theoretical physics, statistics, electrical engineering, etc. The individual chapters have been kept as far as possible independent 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 fi nite number of states ❖ Totally non-negative matrices ❖ Oscillatory matrices ❖ Applications of the theory of matrices to the investigation of systems of linear diff erential equations: Systems of linear diff erential equations with variable coeffi cients. General concepts ❖ Lyapunov transformations Reducible systems ❖ The canonical form of a reducible system Erugin's theorem ❖ The matricant ❖ The multiplicative integral. The infi nitesimal calculus of Volterra ❖ Differential systems in a complex domain. General properties ❖ The multiplicative integral in a complex domain ❖ Isolated singular points ❖ Regular singularities ❖ Reducible analytic systems ❖ Analytic functions of several matrices and their application to the investigation of Diff erential systems. The papers of Lappo-Danilevskii ❖ The problem of Routh-Hurwitz and related questions: Introduction Cauchy indices ❖ Routh's algorithm ❖ The singular case. Examples ❖ Lyapunov's theorem ❖ The theorem of Routh-Hurwitz ❖ Orlando's formula. Singular cases in the Routh-Hurwitz theorem ❖ The method of quadratic forms. Determination of the number of distinct real roots of a polynominal ❖ Infinite Hankel matrices of finite rank ❖ Determination of the index of an arbitrary rational fraction by the coeffi cients of numerator and denominator ❖ Another proof of the Routh-Hurwitz theorem ❖ Some supplements to the Routh-Hurwitz theorem. Stability criterion of Lienard and Chipart Some properties of Hurwitz polynomials. Stieltjes' theorem. Representation of Hurwitz polynomials by continued fractions Domain of stability. Markov parameters Connection with the problem of moments Th eorems of Markov and Chebyshev ❖ The generalized Routh-Hurwitz problem ❖ *Bibliography* ❖ *Index*

2013	276 pp.	Paperback
978-1-4704-0917-3		₹ 680.00

Topics in Applied Abstract Algebra

S R Nagpaul & S K Jain

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		₹ 775.00

Topics in Differential Geometry

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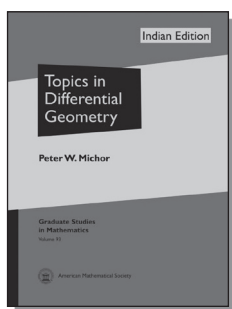
This book treats the fundamentals of differential geometry: manifolds, flows, Lie groups and their actions, invariant theory, differential forms and de Rham cohomology, bundles and connections, Riemann manifolds, isometric actions, and symplectic and Poisson geometry.

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		₹ 840.00

Transformation Groups for Beginners

S V Duzhin & B D Chebotarevsky

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		₹ 640.00

Twenty-Four Hours of Local Cohomology

Srikanth B Iyengar, Graham J Leuschke, Anton Leykin, Claudia Miller, Ezra Miller, Anurag K Singh & Uli Walther

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		₹ 755.00

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.

Arithmetic and Algebra: Numbers and the beginnings of Algebra

Shailesh A Shirali
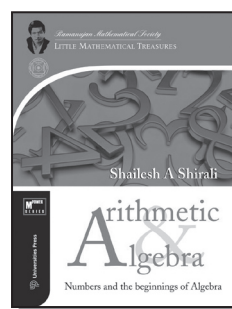
Arithmetic and Algebra: Numbers and the beginnings of Algebra is written for students of mathematics in classes 7 to 10. It can be used by middle school and high school mathematics teachers who wish to take their students to a deeper level of the subject; it can also be studied by those who have a general interest in the subject. With the help of revealing examples and exercises, the book aims to help

students journey into a world of pattern, power and beauty—a journey which can enrich their life greatly.

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

Contents: The World of Numbers: The unending supply of numbers ❖ Roman numerals ❖ Hindu–Arabic numerals ❖ Positive and negative ❖ Addition and subtraction ❖ Multiplication and division ❖ Number patterns ❖ Palindromic entertainment ❖ Miscellaneous problems I ❖ Miscellaneous problems II ❖ Miscellaneous problems III ❖ Beginnings of Algebra: Framing sentences ❖ Expressing patterns ❖ Laws of algebra ❖ Using algebra to explain patterns ❖ Using algebra to discover properties ❖ Factorisation ❖ Equations Closing quotes ❖ Families of Integers: Odd and even ❖ Multiples of ❖ 3 Multiples of 5 ❖ Prime and composite ❖ GCD and LCM ❖ Euclid's algorithm ❖ Perfect numbers ❖ Squares and cubes ❖ Triangular numbers ❖ Powers of 2 ❖ Miscellaneous problems ❖ Fractions, Decimals and Percentages: Fractions as numbers ❖ Equivalent fractions ❖ Arithmetic with fractions ❖ Decimal fractions ❖ Percentages ❖ Fractions on the number line ❖ Rational numbers ❖ Miscellaneous exercises ❖ Fractions: Special Topics: Recurring decimals ❖ Powers of integers—on a clothes line! ❖ Cyclic numbers ❖ Decimal expansion of 1/p ❖ Irrational numbers ❖ Unit fractions ❖ Mischievous fractions Farey sequences ❖ Miscellaneous exercises ❖ Ratio and Proportion: Ratios for unit conversion ❖ Rate ❖ Dimensionless ratios ❖ Proportion ❖ Results concerning proportion ❖ Continued proportion ❖ Historical note ❖ Approximations to pi ❖ The tangram puzzle ❖ Indices and Exponents: Introduction ❖ The laws of indices ❖ Big numbers ❖ The four twos ❖ Visualising big numbers ❖ Negative exponents ❖ Fractional exponents ❖ Growth patterns ❖ Exponential notation in science ❖ Three diversions ❖ Polynomials: Notion of a polynomial ❖ Degree of the zero polynomial ❖ Alternate definition ❖ Multiplication ❖ Division ❖ GCD ❖ Roots of a polynomial ❖ The remainder theorem ❖ Symmetric polynomials ❖ Expansions in Algebra: Homogeneous expressions ❖ Expansions using shortcuts ❖ Binomial expansions I ❖ Using the Pascal triangle ❖ Binomial expansions II ❖ Squares of multinomials ❖ Sum and product formulas ❖ Difference of two squares ❖ Visual representations ❖ Miscellaneous expansions ❖ A claim of Ramanujan's ❖ Factorisation of

Polynomials: Difference of two squares ❖ Application to integer factorisation ❖ Factorisation by breaking up an expression ❖ Factorisation of quadratic trinomials ❖ A more complex example ❖ Using the factor theorem ❖ A square investigation ❖ Linear Equations: Introduction to equations ❖ Genesis of equations ❖ Solution sets ❖ Solving an equation ❖ Linear equations in two unknowns ❖ Application I: Clock problems ❖ Application II: Pythagorean triples ❖ Application III: Squares in AP ❖ Application IV: Unit fractions ❖ Problem Corner: Appetisers ❖ For the junior mathlete ❖ Investigations: Mischievous cancellations ❖ Mischievous square roots ❖ Prime numbers ❖ Digital sums ❖ Digital reversals ❖ Squares and 2006 . . . ❖ Squares and cubes ❖ Still more squares ❖ And yet more squares . . . ❖ Accommodating numbers ❖ *Answers* ❖ *Exercises* ❖ *Index*

2012	360 pp.	Paperback
978-81-7371-767-3		₹ 450.00

Gateway to Modern Mathematics, A: Adventures in Iterations I

Shailesh A Shirali

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		₹ 425.00

Gateway to Modern Mathematics, A: Adventures in Iteration II

Shailesh A Shirali

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		₹ 425.00

MATHEMATICAL MARVELS
(A SERIES BY SHAILESH A SHIRALI)

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		₹ 425.00

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		₹ 275.00

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		₹ 295.00

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		₹ 345.00

MATHEMATICAL WORLD
(A SERIES IN ASSOCIATION WITH THE AMERICAN MATHEMATICAL SOCIETY)

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.

Mathematical Circles (Russian Experience)

Dmitri Fomin, Sergey Genkin & Ilia Itenberg

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		₹ 325.00

Techniques of Problem Solving

Steven G Krantz

The purpose of this book is to teach the basic principles of problem solving, including both mathematical and non-mathematical problems. Taking a direct and practical approach to the subject matter, Krantz's book stands apart from others like it in that it incorporates exercises throughout the text. *Additional problems are included for readers to tackle at the end of each chapter. There are more than 350 problems in all. A Solutions Manual to most end-of-chapter exercises is available.*

1998	480 pp.	Paperback
978-81-7371-116-9		₹ 550.00

ENCYCLOPAEDIA

Encyclopaedia of Classical Indian Sciences

Helaine Selin & Roddam Narasimha
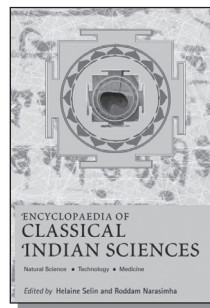
India's contributions to science and technology are among the most ancient and influential in the world. In mathematics, the decimal place value system with zero as a numeral, used universally today, owes its origin to India. The science of Ayurveda, which has been practised for millennia in India, is 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 ⬧ Mahavlra ⬧ 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 ⬧ Sailkara 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	492 pp.	Hardback
978-81-7371-555-6		₹ 1025.00

Science 366: A Chronicle of Science and Technology

Biman Basu
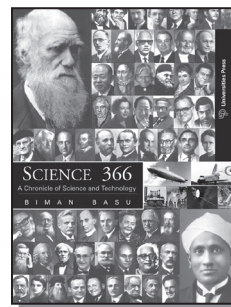
Dates have an important place in our lives—not only are they historical occasions that we observe every year but they are also milestones to measure our growth in age, prosperity and wisdom. Therefore, dates in the scientific field can be used as a measure of progress in our quest for the unknown—dates 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		₹ 995.00

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

Philip Barker
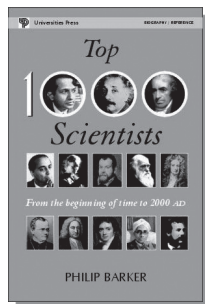
The history of scientific progress is full of surprises. How many people realise, for example, that the term 'electricity' was coined in 1646?, or that Benjamin Franklin invented the lightning conductor?, that even a seemingly recent invention such as the television turns out to have been patented in 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		₹ 650.00

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		₹ 275.00

Bose and His Statistics

G Venkataraman
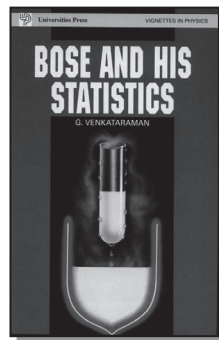
This book describes a monumental discovery made by Satyendranath Bose. It also helps the reader take a step closer in understanding Bose—the scientist—and describes the events that surround this exciting discovery.

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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.

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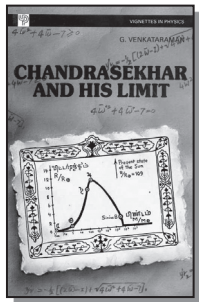
This book deals with the famous Scattering Effect discovered by Sir C. V. Raman. It gives us deep insights into the character of this famous scientist and vividly describes the circumstances surrounding the discovery.

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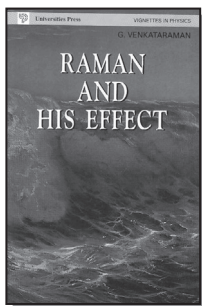
A great leap forward in unravelling the mysteries of the Sun occurred way back in 1920 when Meghnad Saha made an important discovery that paved the way for a systematic study of stellar atmospheres in general. This book is about that great discovery and the man who made it.

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1995	206 pp.	Paperback
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Wings of Fire: An Autobiography
(Abridged, Special Student Edition with Exercises)

A P J Abdul Kalam with Arun Tiwari
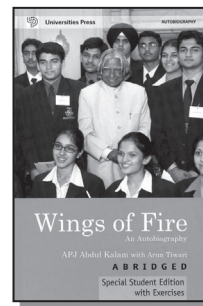
APJ Abdul Kalam's autobiography depicts an extraordinary life: a child born into a little-educated family of boat-owners in Rameswaram—a small pilgrim town in Tamilnadu—who grew up to lead India's space research and missile development programmes, and emerged as one of the most important scientist-leaders of our time.

Wings of Fire is a powerful story of courage and belief, as much an individual journey as the saga of independent India's search for scientific and technological self-sufficiency. This simplified and abridged version now makes *Dr Kalam's* inspirational story accessible to all readers.

A comprehensive *glossary* provides help in the understanding of technical terms. *This Special Student Edition contains Exercises.*

Contents: Strong Roots ◆ Early Influences ◆ Education Provides a Solid Foundation ◆ Preparing to Start a Career ◆ Exercises for Chapter 1 – 4 ◆ Work Begins in Earnest ◆ From Hovercraft to Rockets ◆ Adding Momentum to Space Research ◆ Balancing Defense Technology with Space Research ◆ Exercises for Chapters 5-8 ◆ Dreaming of Satellites ◆ The End of an Era ◆ Leading a Team ◆ Dear ones Pass On ◆ Exercises for Chapters 9 – 12 ◆ Work Bring Solace ◆ Setbacks, Failures and Friends ◆ Success at Last ◆ Moving On ◆ Exercises for Chapters 13 – 16 ◆ A New Job and a Wedding ◆ Making Our Own Missiles ◆ An Infusion of Young Blood ◆ About Motivation and Working Well ◆ Exercises for Chapters 17 – 20 ◆ Earth to Fire : Prithvi to Agni ◆ The Fire of Success: Recognition and Love ◆ Sharing Insights ◆ Looking Ahead ◆ Exercises for Chapters 21 – 24

❖ Afterword ❖ People who influenced the Author ❖ *List of Abbreviated Terms* ❖ *Glossary*

2004	144 pp.	Paperback
978-81-7371-548-8		₹ 150.00

Wings of Fire: An Autobiography

A P J Abdul Kalam with Arun Tiwari
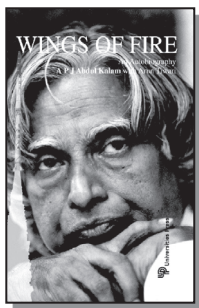
Avul Pakir Jainulabdeen Abdul Kalam, the son of a little-educated boat-owner in Rameswaram, Tamil Nadu, had an unparalleled career as a defence scientist, culminating in the highest civilian award of India, the *Bharat Ratna*. As chief of the country's defence research and development programme, *Kalam* demonstrated the great potential for dynamism and innovation that existed in seemingly moribund research establishments.

This is the story of *Kalam's* rise from obscurity and his personal and professional struggles, as well as the story of Agni, Prithvi, Akash, Trishul and Nag—missiles that have become household names in India and that 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.

Contents: *Preface* ❖ *Acknowledgements* ❖ *Introduction* ❖ Orientation ❖ Creation ❖ Propitiation Contemplation ❖ *Epilogue*

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

1999	212 pp.	Paperback
978-81-7371-146-6		₹ 295.00

HISTORY OF SCIENCE

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

D M Bose, S N Sen & B V Subbarayappa(Eds)
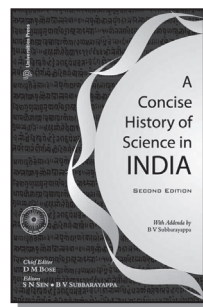
India's contributions in the field of science have been very influential in the development of human civilisation. The decimal place value system and the Ayurvedic way of life are just two well-known legacies of this ancient culture. Yet there are only a few books which provide an unbiased and authentic view of this world. One reason for this is that the study of Indian science through the ages involves the complex integration of the knowledge of many languages and diverse scientific disciplines. Through the years, there has been growing interest in this study as an important aspect in understanding man's interaction with nature, his material life and cultural patterns. The Indian National Science Academy, through its History of Science Board (1958) and the National Commission for the Compilation of History of Sciences in India (1967) renamed in 1989 as the Indian National Commission for History of Science sought further means to stimulate this interest among universities and scholars. The result was the publication of *A Concise History of Science in India*.

This book attempts to present a brief account of the development of science from early times to Independence, in one of the most ancient civilisations of the world. After nearly four decades since its publication, A Concise History of Science in India remains one of the most extensive and authentic account of Indian science through the ages. Yet further studies in the field have brought to light

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

2009	980 pp.	Paperback
978-81-7371-619-5		₹ 1095.00

Kariamanikkam Srinivasa Krishnan: His Life and Work

D C V Mallik & S Chatterjee
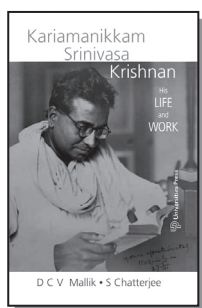
The first four decades of the 20th century were glorious years for science, especially physics. Our view of the physical world changed forever with the emergence of quantum mechanics and Einstein's formulation of the theory of relativity. India too contributed significantly to this scientific revolution 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 become an able science policy maker and administrator; innately he was 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: Raman Scattering* ⬧ *Diamagnetic and Paramagnetic Susceptibilities* ⬧ *Formulae for Electrical Resistivity of Metals Primary Sources* ⬧ *Bibliography* ⬧ *Index*

2011	516 pp.	Hardback
978-81-7371-748-2		₹ 895.00

Paths of Innovators, Volume 1

R Parthasarathy

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 ⬧

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Paths of Innovators, Volume 2

R Parthasarathy
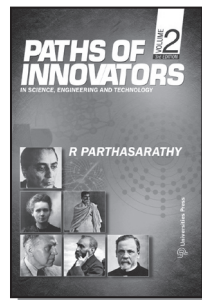
This is the second volume of a set of two volumes. It comprises a collection of scientists' lives, their struggles, their achievements and their laurels. The scientists have been grouped under five disciplines— Engineering, Physics, Mathematics, Chemistry and Life Sciences. The reader meets people from 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 ⬥ GeorgeCockcroft ⬥ John Daimler ⬥ Gottlieb De Laval ⬥ Gustav Francis ⬥ James Grove ⬥ Andrew Guillemin ⬥ Ernst Kaplan ⬥ Victor Kelly ⬥ William Khosla ⬥ A. N. 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 ⬥ J. R. D. Vishveshwaraya ⬥ M. Von Bekesy ⬥ Georg Westinghouse ⬥ George Wheatstone ⬥ Charles Wollaston ⬥ William Wright ⬥ Orville Wright ⬥ Wilbur

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GENERAL INTEREST

Agenda of the Apprentice Scientist, The

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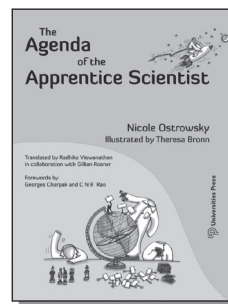
Here are *365 activities to discover* that science is a part of our daily life, that you can take part in it with pleasure, that it can be easy, sometimes surprising and funny, and always accessible to everyone, from 7 to 107. All you need to have is a curiosity about the world around you.

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.

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