

## ***Solution Of Exercise Functional Analysis Rudin***

This classic text is written for graduate courses in functional analysis. This text is used in modern investigations in analysis and applied mathematics. This new edition includes up-to-date presentations of topics as well as more examples and exercises. New topics include Kakutani's fixed point theorem, Lomonosov's invariant subspace theorem, and an ergodic theorem. This text is part of the Walter Rudin Student Series in Advanced Mathematics.

Exercises in Functional Analysis Springer Science & Business Media

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.

topics. However, only a modest preliminary knowledge is needed. In the first chapter, where we introduce an important topological concept, the so-called topological degree for continuous maps from subsets of  $\mathbb{R}^n$  into  $\mathbb{R}^n$ , you need not know anything about functional analysis. Starting with Chapter 2, where infinite dimensions first appear, one should be familiar with the essential step of considering a sequence or a function of some sort as a point in the corresponding vector space of all such sequences or functions, whenever this abstraction is worthwhile. One should also work out the things which are proved in § 7 and accept certain basic principles of linear functional analysis quoted there for easier references, until they are applied in later chapters. In other words, even the 'completely linear' sections which we have included for your convenience serve only as a vehicle for progress in nonlinearity. Another point that makes the text introductory is the use of an essentially uniform mathematical language and way of thinking, one which is no doubt familiar from elementary lectures in analysis that did not worry much about its connections with algebra and topology. Of course we shall use some elementary topological concepts, which may be new, but in fact only a few remarks here and there pertain to algebraic or differential topological concepts and methods.

Computational Functional Analysis

Theoretical Numerical Analysis

An Introduction to Functional Analysis

A Friendly Approach to Functional Analysis

***The goal of this textbook is to provide 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 it is as self-contained as possible. The only prerequisites for the first part are minimal amounts of linear algebra and calculus. However, for the second course (Part II), it is useful to have some knowledge of topology and measure theory. Each chapter is followed by numerous exercises, whose***

*solutions are given at the end of the book.*

*This course text fills a gap for first-year graduate-level students reading applied functional analysis or advanced engineering analysis and modern control theory. Containing 100 problem-exercises, answers, and tutorial hints, the first edition is often cited as a standard reference. Making a unique contribution to numerical analysis for operator equations, it introduces interval analysis into the mainstream of computational functional analysis, and discusses the elegant techniques for reproducing Kernel Hilbert spaces. There is discussion of a successful "hybrid" method for difficult real-life problems, with a balance between coverage of linear and non-linear operator equations. The authors successful teaching philosophy: "We learn by doing" is reflected throughout the book.*

*Contains 100 problem-exercises, answers and tutorial hints for students reading applied functional analysis Introduces interval analysis into the mainstream of computational functional analysis "Covers metric, topological, normed, and Hilbert spaces; bounded linear operators; Hamel, Schauder, and Hilbert bases. Theorems include Banach fixed point, Baire's category, Banach-Steinhaus, open mapping, Weierstrass approximation, Stone-Weierstrass, Baire-Osgood, Muntz. Appendix gives background on set theory and linear algebra. Index and approximately 120 pages of solutions to odd-numbered exercises" --Provided by publisher.*

*With this second volume, we enter the intriguing world of complex analysis. From the first theorems on, the elegance and sweep of the results is evident. The starting point is the simple idea of extending a function initially given for real values of the argument to one that is defined when the argument is complex. From there, one proceeds to the main properties of holomorphic functions, whose proofs are generally short and quite illuminating: the Cauchy theorems, residues, analytic continuation, the argument principle. With this background, the reader is ready to learn a wealth of additional material connecting the subject with other areas of mathematics: the Fourier transform treated by contour integration, the zeta function and the prime number theorem, and an introduction to elliptic functions culminating in their application to combinatorics and number theory. Thoroughly developing a subject with many ramifications, while striking a careful balance between conceptual insights and the technical underpinnings of rigorous analysis, Complex Analysis will be welcomed by students of mathematics, physics, engineering and other sciences. The Princeton Lectures in Analysis represents a sustained effort to introduce the core areas of mathematical analysis while also illustrating the organic unity between them. Numerous examples and applications throughout its four planned volumes, of which Complex Analysis is the second, highlight the far-reaching consequences of certain ideas in analysis to other fields of mathematics and a variety of sciences. Stein and Shakarchi move from an introduction addressing Fourier series and integrals to in-depth considerations of complex analysis; measure and integration theory, and Hilbert spaces; and, finally, further topics such as functional analysis, distributions and elements of probability theory.*

*Topics in Functional Analysis and Applications*

*Fundamentals of Applied Functional Analysis*

*Applied Functional Analysis, Second Edition*

*An Introduction to Banach Space Theory*

**Even the simplest mathematical abstraction of the phenomena of reality the real line can be regarded from different points of view by different mathematical disciplines. For example, the algebraic approach to the study of the real line involves describing its properties as a set to whose elements we can apply" operations," and obtaining an algebraic model of it on the basis of these properties, without regard for the topological properties. On the other hand, we can focus on the topology of the real line and construct a formal model of it by singling out its" continuity" as a basis for the model. Analysis regards the line, and the functions on it, in the unity of the whole system of their algebraic and topological properties, with the fundamental deductions about them obtained by using the interplay between the algebraic and topological structures. The same picture is observed at higher stages of abstraction. Algebra studies linear**

spaces, groups, rings, modules, and so on. Topology studies structures of a different kind on arbitrary sets, structures that give mathematical meaning to the concepts of a limit, continuity, a neighborhood, and so on. Functional analysis takes up topological linear spaces, topological groups, normed rings, modules of representations of topological groups in topological linear spaces, and so on. Thus, the basic object of study in functional analysis consists of objects equipped with compatible algebraic and topological structures.

Through numerous illustrative examples and comments, *Applied Functional Analysis, Second Edition* demonstrates the rigor of logic and systematic, mathematical thinking. It presents the mathematical foundations that lead to classical results in functional analysis. More specifically, the text prepares students to learn the variational theory of partial differential equations, distributions and Sobolev spaces, and numerical analysis with an emphasis on finite element methods. While retaining the structure of its best-selling predecessor, this second edition includes revisions of many original examples, along with new examples that often reflect the authors' own vast research experiences and perspectives. This edition also provides many more exercises as well as a solutions manual for qualifying instructors. Each chapter begins with an extensive introduction and concludes with a summary and historical comments that frequently refer to other sources. New to the Second Edition Completely revised section on  $\limsup$  and  $\liminf$  New discussions of connected sets, probability, Bayesian statistical inference, and the generalized (integral) Minkowski inequality New sections on elements of multilinear algebra and determinants, the singular value decomposition theorem, the Cauchy principal value, and Hadamard finite part integrals New example of a Lebesgue non-measurable set Ideal for a two-semester course, this proven textbook teaches students how to prove theorems and prepares them for further study of more advanced mathematical topics. It helps them succeed in formulating research questions in a mathematically rigorous way.

"Functional analysis studies the algebraic, geometric, and topological structures of spaces and operators that underlie many classical problems. Individual functions satisfying specific equations are replaced by classes of functions and transforms that are determined by the particular problems at hand. This book presents the basic facts of linear functional analysis as related to fundamental aspects of mathematical analysis and their applications. The exposition avoids unnecessary terminology and generality and focuses on showing how the knowledge of these structures clarifies what is essential in analytic problems. The material in the first part of the book can be used for an introductory course on functional analysis, with an emphasis on the role of duality. The second part introduces distributions and Sobolev spaces and their applications. Convolution and the Fourier transform are shown to be useful tools for the study of partial differential equations. Fundamental solutions and Green's functions are considered and the theory is illustrated with several applications. In the last chapters, the Gelfand transform for Banach algebras is used to present the spectral theory of bounded and unbounded operators, which is then used in an introduction to the basic axioms of quantum mechanics. The presentation is intended to be accessible to readers whose backgrounds include basic linear algebra, integration theory, and general topology. Almost 240 exercises will help the reader in better understanding the concepts employed."--Publisher's description.

Mathematics is playing an ever more important role in the physical and biological sciences, provoking a blurring of boundaries between scientific disciplines and a resurgence of interest in the modern as well as the classical techniques of applied mathematics. This renewal of interest, both in research and teaching, has led to the

establishment of the series: Texts in Applied Mathematics (TAM).

The development of new courses is a natural consequence of a high level of excitement on the research frontier as newer techniques, such as numerical and symbolic computer systems, dynamical systems, and chaos, mix with and reinforce the traditional methods of applied mathematics. Thus, the purpose of this textbook series is to meet the current and future needs of these advances and to encourage the teaching of new courses. TAM will publish textbooks suitable for use in advanced undergraduate and beginning graduate courses, and will complement the Applied Mathematical Sciences (AMS) series, which will focus on advanced textbooks and research-level monographs.

Functional Analysis, Calculus of Variations and Optimal Control

Functional Analysis, Sobolev Spaces and Partial Differential Equations

Complex Analysis

Linear Functional Analysis

*Preparing students for further study of both the classical works and current research, this is an accessible text for students who have had a course in real and complex analysis and understand the basic properties of  $L^p$  spaces. It is sprinkled liberally with examples, historical notes, citations, and original sources, and over 450 exercises provide practice in the use of the results developed in the text through supplementary examples and counterexamples.*

*Functional analysis owes much of its early impetus to problems that arise in the calculus of variations. In turn, the methods developed there have been applied to optimal control, an area that also requires new tools, such as nonsmooth analysis. This self-contained textbook gives a complete course on all these topics. It is written by a leading specialist who is also a noted expositor. This book provides a thorough introduction to functional analysis and includes many novel elements as well as the standard topics. A short course on nonsmooth analysis and geometry completes the first half of the book whilst the second half concerns the calculus of variations and optimal control. The author provides a comprehensive course on these subjects, from their inception through to the present. A notable feature is the inclusion of recent, unifying developments on regularity, multiplier rules, and the Pontryagin maximum principle, which appear here for the first time in a textbook. Other major themes include existence and Hamilton-Jacobi methods. The many substantial examples, and the more than three hundred exercises, treat such topics as viscosity solutions, nonsmooth Lagrangians, the logarithmic Sobolev inequality, periodic trajectories, and systems theory. They also touch lightly upon several fields of application: mechanics, economics, resources, finance, control engineering. Functional Analysis, Calculus of Variations and Optimal Control is intended to support several different courses at the first-year or second-year graduate level, on functional analysis, on the calculus of variations and optimal control, or on some combination. For this reason, it has been organized with customization in mind. The text also has considerable value as a reference. Besides its advanced results in the calculus of variations and optimal*

*control, its polished presentation of certain other topics (for example convex analysis, measurable selections, metric regularity, and nonsmooth analysis) will be appreciated by researchers in these and related fields. Techniques of Functional Analysis for Differential and Integral Equations describes a variety of powerful and modern tools from mathematical analysis, for graduate study and further research in ordinary differential equations, integral equations and partial differential equations. Knowledge of these techniques is particularly useful as preparation for graduate courses and PhD research in differential equations and numerical analysis, and more specialized topics such as fluid dynamics and control theory. Striking a balance between mathematical depth and accessibility, proofs involving more technical aspects of measure and integration theory are avoided, but clear statements and precise alternative references are given. The work provides many examples and exercises drawn from the literature. Provides an introduction to mathematical techniques widely used in applied mathematics and needed for advanced research in ordinary and partial differential equations, integral equations, numerical analysis, fluid dynamics and other areas Establishes the advanced background needed for sophisticated literature review and research in differential equations and integral equations Suitable for use as a textbook for a two semester graduate level course for M.S. and Ph.D. students in Mathematics and Applied Mathematics*

*Key Features: Basic knowledge in functional analysis is a pre-requisite. Illustrations via partial differential equations of physics provided. Exercises given in each chapter to augment concepts and theorems. About the Book: The book, written to give a fairly comprehensive treatment of the techniques from Functional Analysis used in the modern theory of Partial Differential Equations, is now in its third edition. The original structure of the book has been retained but each chapter has been revamped. Proofs of several theorems have been either simplified or elaborated in order to achieve greater clarity. It is hoped that this version is even more user-friendly than before. In the chapter on Distributions, some additional results, with proof, have been presented. The section on Convolution of Functions has been rewritten. In the chapter on Sobolev Spaces, the section containing Stampacchia's theorem on composition of functions has been reorganized. Some additional results on Eigenvalue problems are presented. The material in the text is supplemented by four appendices and updated bibliography at the end.*

*Lectures and Exercises on Functional Analysis*

**FUNCTIONAL ANALYSIS**

*Problems in Operator Theory*

*Functional Analysis and Time Optimal Control*

**This book contains almost 450 exercises, all with complete solutions; it**

provides supplementary examples, counter-examples, and applications for the basic notions usually presented in an introductory course in Functional Analysis. Three comprehensive sections cover the broad topic of functional analysis. A large number of exercises on the weak topologies is included. The material presented in this book is suited for a first course in Functional Analysis which can be followed by Masters students. While covering all the standard material expected of such a course, efforts have been made to illustrate the use of various theorems via examples taken from differential equations and the calculus of variations, either through brief sections or through exercises. In fact, this book will be particularly useful for students who would like to pursue a research career in the applications of mathematics. The book includes a chapter on weak and weak topologies and their applications to the notions of reflexivity, separability and uniform convexity. The chapter on the Lebesgue spaces also presents the theory of one of the simplest classes of Sobolev spaces. The book includes a chapter on compact operators and the spectral theory for compact self-adjoint operators on a Hilbert space. Each chapter has large collection of exercises at the end. These illustrate the results of the text, show the optimality of the hypotheses of various theorems via examples or counterexamples, or develop simple versions of theories not elaborated upon in the text. Intended as an introductory text on Functional Analysis for the postgraduate students of Mathematics, this compact and well-organized book covers all the topics considered essential to the subject. In so doing, it provides a very good understanding of the subject to the reader. The book begins with a review of linear algebra, and then it goes on to give the basic notion of a norm on linear space (proving thereby most of the basic results), progresses gradually, dealing with operators, and proves some of the basic theorems of Functional Analysis. Besides, the book analyzes more advanced topics like dual space considerations, compact operators, and spectral theory of Banach and Hilbert space operators. The text is so organized that it strives, particularly in the last chapter, to apply and relate the basic theorems to problems which arise while solving operator equations. The present edition is a thoroughly revised version of its first edition, which also includes a section on Hahn-Banach extension theorem for operators and discussions on Lax-Milgram theorem. This student-friendly text, with its clear exposition of concepts, should prove to be a boon to the beginner aspiring to have an insight into Functional Analysis.

**KEY FEATURES** • Plenty of examples have been worked out in detail, which not only illustrate a particular result, but also point towards its limitations so that subsequent stronger results follow. • Exercises, which are designed to aid understanding and to promote mastery of the subject, are interspersed throughout the text.

**TARGET AUDIENCE** • M.Sc. Mathematics

This textbook, based on three series of lectures held by the author at the University of Strasbourg, presents functional analysis in a non-traditional way by generalizing elementary theorems of plane geometry to spaces of arbitrary dimension. This approach leads naturally to the basic notions and

theorems. Most results are illustrated by the small  $l_p$  spaces. The Lebesgue integral, meanwhile, is treated via the direct approach of Frigyes Riesz, whose constructive definition of measurable functions leads to optimal, clear-cut versions of the classical theorems of Fubini-Tonelli and Radon-Nikodým. Lectures on Functional Analysis and the Lebesgue Integral presents the most important topics for students, with short, elegant proofs. The exposition style follows the Hungarian mathematical tradition of Paul Erdős and others. The order of the first two parts, functional analysis and the Lebesgue integral, may be reversed. In the third and final part they are combined to study various spaces of continuous and integrable functions. Several beautiful, but almost forgotten, classical theorems are also included. Both undergraduate and graduate students in pure and applied mathematics, physics and engineering will find this textbook useful. Only basic topological notions and results are used and various simple but pertinent examples and exercises illustrate the usefulness and optimality of most theorems. Many of these examples are new or difficult to localize in the literature, and the original sources of most notions and results are indicated to help the reader understand the genesis and development of the field.

**An Introduction**

**Nonlinear Functional Analysis**

**Classical and Discrete Functional Analysis with Measure Theory**

**Lecture Notes on Functional Analysis with Applications to Linear Partial Differential Equations**

***Includes sections on the spectral resolution and spectral representation of self adjoint operators, invariant subspaces, strongly continuous one-parameter semigroups, the index of operators, the trace formula of Lidskii, the Fredholm determinant, and more. \* Assumes prior knowledge of Naive set theory, linear algebra, point set topology, basic complex variable, and real variables. \* Includes an appendix on the Riesz representation theorem.***

***This volume provides an introduction to modern concepts of linear and nonlinear functional analysis. Its purpose is also to provide an insight into the variety of deeply interlaced mathematical tools applied in the study of nonlinear problems.***

***This book constitutes a concise introductory course on Functional Analysis for students who have studied calculus and linear algebra. The topics covered are Banach spaces, continuous linear transformations, Frechet derivative, geometry of Hilbert spaces, compact operators, and distributions. In addition, the book includes selected applications of functional analysis to differential equations, optimization, physics (classical and quantum mechanics), and numerical analysis. The book contains 197 problems, meant to***

**reinforce the fundamental concepts. The inclusion of detailed solutions to all the exercises makes the book ideal also for self-study. A Friendly Approach to Functional Analysis is written specifically for undergraduate students of pure mathematics and engineering, and those studying joint programmes with mathematics. Request Inspection Copy**

**The unifying approach of functional analysis is to view functions as points in abstract vector space and the differential and integral operators as linear transformations on these spaces. The author's goal is to present the basics of functional analysis in a way that makes them comprehensible to a student who has completed courses in linear algebra and real analysis, and to develop the topics in their historical contexts.**

### **A FIRST COURSE**

**Introduction to Further Topics in Analysis**

**Techniques of Functional Analysis for Differential and Integral Equations**

### **A Course in Functional Analysis**

The book is based on courses taught by the author at Moscow State University. Compared to many other books on the subject, it is unique in that the exposition is based on extensive use of the language and elementary constructions of category theory. Among topics featured in the book are the theory of Banach and Hilbert tensor products, the theory of distributions and weak topologies, and Borel operator calculus. The book contains many examples illustrating the general theory presented, as well as multiple exercises that help the reader to learn the subject. It can be used as a textbook on selected topics of functional analysis and operator theory. Prerequisites include linear algebra, elements of real analysis, and elements of the theory of metric spaces.

This textbook is a completely revised, updated, and expanded English edition of the important *Analyse fonctionnelle* (1983). In addition, it contains a wealth of problems and exercises (with solutions) to guide the reader. Uniquely, this book presents in a coherent, concise and unified way the main results from functional analysis together with the main results from the theory of partial differential equations (PDEs). Although there are many books on functional analysis and many on PDEs, this is the first to cover both of these closely connected topics. Since the French book was first published, it has been translated into Spanish, Italian, Japanese, Korean, Romanian, Greek and Chinese. The English edition makes a welcome addition to this list.

Accessible text covering core functional analysis topics in Hilbert and Banach spaces, with detailed proofs and 200 fully-worked exercises.

Functional Analysis and Time Optimal Control

Understanding Analysis

Functional Analysis and Summability  
Functional Analysis

*Written as a textbook, A First Course in Functional Analysis is an introduction to basic functional analysis and operator theory, with an emphasis on Hilbert space methods. The aim of this book is to introduce the basic notions of functional analysis and operator theory without requiring the student to have taken a course in measure theory as a prerequisite. It is written and structured the way a course would be designed, with an emphasis on clarity and logical development alongside real applications in analysis. The background required for a student taking this course is minimal; basic linear algebra, calculus up to Riemann integration, and some acquaintance with topological and metric spaces.*

*This introduction to the ideas and methods of linear functional analysis shows how familiar and useful concepts from finite-dimensional linear algebra can be extended or generalized to infinite-dimensional spaces. Aimed at advanced undergraduates in mathematics and physics, the book assumes a standard background of linear algebra, real analysis (including the theory of metric spaces), and Lebesgue integration, although an introductory chapter summarizes the requisite material. A highlight of the second edition is a new chapter on the Hahn-Banach theorem and its applications to the theory of duality.*

*Applied Functional Analysis, Third Edition provides a solid mathematical foundation for the subject. It motivates students to study functional analysis by providing many contemporary applications and examples drawn from mechanics and science. This well-received textbook starts with a thorough introduction to modern mathematics before continuing with detailed coverage of linear algebra, Lebesgue measure and integration theory, plus topology with metric spaces. The final two chapters provides readers with an in-depth look at the theory of Banach and Hilbert spaces before concluding with a brief introduction to Spectral Theory. The Third Edition is more accessible and promotes interest and motivation among students to prepare them for studying the mathematical aspects of numerical analysis and the mathematical theory of finite elements.*

*This advanced graduate textbook presents main results and techniques in Functional Analysis and uses them to explore other areas of mathematics and applications. Special attention is paid to creating appropriate frameworks towards solving significant problems involving differential and integral equations. Exercises at the end of each chapter help the reader to understand the richness of ideas and methods offered by Functional Analysis. Some of the exercises supplement theoretical material, while others relate to the real world. This textbook, with its friendly exposition, focuses on different problems in physics and other applied sciences and uniquely provides solutions to most of the exercises. The text is aimed toward graduate students and researchers in applied mathematics, physics, and neighboring fields of science.*

*Functional Analysis for the Applied Sciences*

*Theorems and Problems in Functional Analysis*

***Introductory Functional Analysis with Applications***

***Beginning Functional Analysis***

This advanced undergraduate/beginning graduate text covers measure theory and discrete aspects of functional analysis, with 760 exercises.

KREYSZIG The Wiley Classics Library consists of selected books originally published by John Wiley & Sons that have become recognized classics in their respective fields. With these new unabridged and inexpensive editions, Wiley hopes to extend the life of these important works by making them available to future generations of mathematicians and scientists. Currently available in the Series:

Emil Artin Geometric Algebra R. W. Carter Simple Groups Of Lie Type  
Richard Courant Differential and Integral Calculus. Volume I  
Richard Courant Differential and Integral Calculus. Volume II  
Richard Courant & D. Hilbert Methods of Mathematical Physics, Volume I  
Richard Courant & D. Hilbert Methods of Mathematical Physics. Volume II  
Harold M. S. Coxeter Introduction to Modern Geometry. Second Edition  
Charles W. Curtis, Irving Reiner Representation Theory of Finite Groups and Associative Algebras  
Nelson Dunford, Jacob T. Schwartz Linear Operators. Part One. General Theory  
Nelson Dunford, Jacob T. Schwartz Linear Operators, Part Two. Spectral Theory—Self Adjunct Operators in Hilbert Space  
Nelson Dunford, Jacob T. Schwartz Linear Operators. Part Three. Spectral Operators  
Peter Henrici-Oliver Applied and Computational Complex Analysis. Volume I—Power Series—Integration—Conformal Mapping—Location of Zeros  
Peter Hilton, Yet-Chiang Wu A Course in Modern Algebra  
Harry Hochstadt Integral Equations  
Erwin Kreyszig Introductory Functional Analysis with Applications  
P. M. Prenter Splines and Variational Methods  
C. L. Siegel TOPICS in Complex Function Theory. Volume I—Elliptic Functions and Uniformization Theory  
C. L. Siegel Topics in Complex Function Theory. Volume II—Automorphic and Abelian Integrals  
C. L. Siegel TOPICS In Complex Function Theory. Volume III—Abelian Functions & Modular Functions of Several Variables  
J. J. Stoker Differential Geometry

This book is an introductory text in functional analysis. Unlike many modern treatments, it begins with the particular and works its way to the more general. From the reviews: "This book is an excellent text for a first graduate course in functional analysis....Many interesting and important applications are included....It includes an abundance of exercises, and is written in the engaging and lucid style which we have come to expect from the author." --MATHEMATICAL

REVIEWS

"This book covers such topics as  $L^p$  spaces, distributions, Baire category, probability theory and Brownian motion, several complex variables and oscillatory integrals in Fourier analysis. The authors focus on key results in each area, highlighting their importance and the organic unity of the subject"--Provided by publisher.

A First Course in Functional Analysis

Applied Functional Analysis, Third Edition

Lectures on Functional Analysis and the Lebesgue Integral

A Functional Analysis Framework

There are excellent books on both functional analysis and summability. Most of them are very terse. In *Functional Analysis and Summability*, the author makes a sincere attempt for a gentle introduction of these topics to students. In the functional analysis component of the book, the Hahn–Banach theorem, Banach–Steinhaus theorem (or uniform boundedness principle), the open mapping theorem, the closed graph theorem, and the Riesz representation theorem are highlighted. In the summability component of the book, the Silverman–Toeplitz theorem, Schur's theorem, the Steinhaus theorem, and the Steinhaus-type theorems are proved. The utility of functional analytic tools like the uniform boundedness principle to prove some results in summability theory is also pointed out. Features A gentle introduction of the topics to the student is attempted. Basic results of functional analysis and summability theory and their applications are highlighted. Many examples are provided in the text. Each chapter ends with useful exercises. This book will be useful to postgraduate students, pre-research level students, and research scholars in mathematics. Students of physics and engineering will also find this book useful since topics in the book also have applications in related areas.

This elementary presentation exposes readers to both the process of rigor and the rewards inherent in taking an axiomatic approach to the study of functions of a real variable. The aim is to challenge and improve mathematical intuition rather than to verify it. The philosophy of this book is to focus attention on questions which give analysis its inherent fascination. Each chapter begins with the discussion of some motivating examples and concludes with a series of questions. Exercises in Functional Analysis