An Introduction To Banach Space Theory 1st Edition

An Introduction to Functional Analysis
Analysis in Banach Spaces
Introduction to Hilbert Space
Introduction to Banach Spaces and their Geometry
Introduction to the Analysis of Normed Linear Spaces
Introduction to the Theory of Banach Representations of Groups
Banach Spaces for Analysts
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HOOPER SULLIVAN

An Introduction to Functional Analysis Springer Nature
Accessible text covering core functional analysis topics in Hilbert and Banach spaces, with detailed proofs and 200 fully-worked exercises.
Analysis in Banach Spaces John Wiley & Sons
This textbook is an introduction to functional analysis suited to final year undergraduates or beginning graduates. Its various applications of Hilbert spaces, including least squares approximation, inverse problems, and Tikhonov regularization, should appeal not only to mathematicians interested in applications, but also to researchers in related fields. Functional Analysis adopts a self-contained approach to Banach spaces and operator theory that covers the main topics, based upon the classical sequence and function spaces and their operators. It assumes only a minimum of knowledge in elementary linear algebra and real analysis; the latter is redone in the light of metric spaces. It contains more than a thousand worked examples and exercises, which make up the main body of the book.
Introduction to Hilbert Space Cambridge University Press
The Handbook presents an overview of most aspects of modernBanach space theory and its applications. The up-to-date surveys, authored by leading research workers in the area, are written to be accessible to a wide audience. In addition to presenting the state of the art of Banach space theory, the surveys discuss the relation of the subject with such areas as harmonic analysis, complex analysis, classical convexity, probability theory, operator theory, combinatorics, logic, geometric measure theory, and partial differential equations. The Handbook begins with a chapter on basic concepts in Banachspace theory which contains all the background needed for reading any other chapter in the Handbook. Each of the twenty one articles in this volume after the basic concepts chapter is devoted to one specific direction of Banach space theory or its applications. Each article contains a motivated introduction as well as an exposition of the main results, methods, and open problems in its specific direction. Most have an extensive bibliography. Many articles contain new proofs of known results as well as expositions of proofs which are hard to locate in the literature or are only outlined in the original research papers. As well as being valuable to experienced researchers in Banach space theory, the Handbook should be an outstanding source for inspiration and information to graduate students and beginning researchers. The Handbook will be useful for mathematicians who want to get an idea of the various developments in Banach space theory.
Introduction to Banach Spaces and their Geometry Birkhäuser
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Introduction to the Analysis of Normed Linear Spaces Oxford University Press
This text provides the reader with the necessary technical tools and background to reach the frontiers of research without the introduction of too many extraneous concepts. Detailed and accessible proofs are included, as are a variety of exercises and problems. The two new chapters in this second edition are devoted to two topics of much current interest amongst functional analysts: Greedy approximation with respect to bases in Banach spaces and nonlinear geometry of Banach spaces. This new material is intended to present these two directions of research for their intrinsic importance within Banach space theory, and to motivate graduate students interested in learning more about them. This textbook assumes only a basic knowledge of functional analysis, giving the reader a self-contained overview of the ideas and techniques in the development of modern Banach space theory. Special emphasis is placed on the study of the classical Lebesgue spaces Lp (and their sequence space analogues) and spaces of continuous functions. The authors also stress the use of bases and basic sequences techniques as a tool for understanding the isomorphic structure of Banach spaces. From the reviews of the First Edition: "The authors of the book...succeeded admirably in creating a very helpful text, which contains essential topics with optimal proofs, while being reader friendly... It is also written in a lively manner, and its involved mathematical proofs are elucidated and illustrated by motivations, explanations and occasional historical comments... I strongly recommend to every graduate student who wants to get acquainted with this exciting part of functional analysis the instructive and pleasant reading of this book..."—Gilles Godefroy, Mathematical Reviews
Introduction to the Theory of Banach Representations of Groups Springer Science & Business Media
This book is intended to be used with graduate courses in Banach space theory.
Banach Spaces for Analysts Springer
This is a basic course in functional analysis for senior undergraduate and beginning postgraduate students. The reader need only be familiarity with elementary real and complex analysis, linear algebra and have studied a course in the analysis of metric spaces; knowledge of integration theory or general topology is not required. The text concerns the structural properties of normed linear spaces in general, especially associated with dual spaces and continuous linear operators on normed linear spaces. The implications of the general theory are illustrated with a great variety of example spaces.
Banach Space Theory American Mathematical Soc.
Introduction to Banach Spaces and their Geometry
Introduction to Operator Space Theory John Wiley & Sons
This book presents a collection of problems and solutions in functional analysis with applications to quantum mechanics. Emphasis is given to Banach spaces, Hilbert spaces and generalized functions.The material of this volume is self-contained, whereby each chapter comprises an introduction with the relevant notations, definitions, and theorems. The approach in this volume is to provide students with instructive problems along with problem-solving strategies. Programming problems with solutions are also included.
Introduction to Banach Spaces: Analysis and Probability Cambridge University Press
Diese Einfuhrung in das Gebiet der metrischen Raume richtet sich in erster Linie nicht an Spezialisten, sondern an Anwender der Methode aus den verschiedensten Bereichen der Naturwissenschaften. Besonders ausfuhrlich und anschaulich werden die Grundlagen von metrischen Raumen und Banach-Raumen erklart, Anhange enthalten Informationen zu verschiedenen Schlusselkonzepten der Mengentheorie (Zornsches Lemma, Tychonov-Theorem, transfinite Induktion usw.). Die hinteren Kapitel des Buches beschaftigen sich mit fortgeschritteneren Themen.
Introduction to Various Aspects of Degree Theory in Banach Spaces American Mathematical Soc.
The contents of this monograph fall within the general area of nonlinear functional analysis and applications. We focus on an important topic within this area: geometric properties of Banach spaces and nonlinear iterations, a topic of intensive research e?orts, especially within the past 30 years, or so. In this theory, some geometric properties of Banach spaces play a crucial role. In the ?rst part of the monograph, we expose these geometric properties most of which are well known. As is well known, among all in?nite dim- sional Banach spaces, Hilbert spaces have the nicest geometric properties. The availability of the inner product, the fact that the proximity map or nearest point map of a real Hilbert space H onto a closed convex subset K of H is Lipschitzian with constant 1, and the following two identities 2 2 2 ||x+y|| =||x|| +2 x,y +||y|| , (?) 2 2 2 2 ||?x+(1??)y|| = ?||x|| +(1??)||y|| ??(1??)||x?y|| , (??) which hold for all x,y? H, are some of the geometric properties that char- terize inner product spaces and

also make certain problems posed in Hilbert spaces more manageable than those in general Banach spaces. However, as has been rightly observed by M. Hazewinkel, “... many, and probably most, mathematical objects and models do not naturally live in Hilbert spaces”. Consequently,toextendsomeoftheHilbertspacetechniquestomoreg eneral Banach spaces, analogues of the identities (?) and (??) have to be developed.

History of Banach Spaces and Linear Operators Elsevier

Based on a graduate course by the celebrated analyst Nigel Kalton, this well-balanced introduction to functional analysis makes clear not only how, but why, the field developed. All major topics belonging to a first course in functional analysis are covered. However, unlike traditional introductions to the subject, Banach spaces are emphasized over Hilbert spaces, and many details are presented in a novel manner, such as the proof of the Hahn–Banach theorem based on an inf-convolution technique, the proof of Schauder's theorem, and the proof of the Milman–Pettis theorem. With the inclusion of many illustrative examples and exercises, An Introductory Course in Functional Analysis equips the reader to apply the theory and to master its subtleties. It is therefore well-suited as a textbook for a one- or two-semester introductory course in functional analysis or as a companion for independent study.

Summing and Nuclear Norms in Banach Space Theory Springer

This second volume of a two-volume overview focuses on the applications of Banach spaces and recent developments in the field.

Introduction to Banach Spaces: Preface; Preliminary chapter; 1. Fundamental notions of probability; 2. Bases in Banach spaces; 3. Unconditional convergence; 4. Banach space valued random variables; 5. Type and cotype of Banach spaces. Factorisation through a Hilbert space; 6. p-summing operators. Applications; 7. Some properties of Lp-spaces; 8. The space l1; Annex. Banach algebras, compact Abelian groups; Bibliography; Author index; Notation index; Subject index Cambridge University Press

Preface to the English Edition The present monograph is a revised and enlarged alternative of the author's monograph [19] which was devoted to the development of a unified approach to studying differential inclusions, whose values of the right hand sides are compact, not necessarily convex subsets of a Banach space. This approach relies on ideas and methods of modem functional analysis, general topology, the theory of multi-valued mappings and continuous selectors. Although the basic content of the previous monograph has been remained the same this monograph has been partly re-organized and the author's recent results have been added. The contents of the present book are divided into five Chapters and an Appendix. The first Chapter of the J>ook has been left without changes and deals with multi-valued differential equations generated by a differential inclusion. The second Chapter has been significantly revised and extended. Here the au thor's recent results concerning extreme continuous selectors of multi-functions with decomposable values, multi-valued selectors ofmulti-functions generated by a differential inclusion, the existence of solutions of a differential inclusion, whose right hand side has different properties of semicontinuity at different points, have been included. Some of these results made it possible to simplify schemes for proofs concerning the existence of solutions of differential inclu sions with semicontinuous right hand side a.nd to obtain new results. In this Chapter the existence of solutions of different types are considered.

Introduction to Banach Spaces: Analysis and Probability: Cambridge University Press

The objectives of this monograph are to present some topics from the theory of monotone operators and nonlinear semigroup theory which are directly applicable to the existence and uniqueness theory of initial-boundary-value problems for partial differential equations and to construct such operators as realizations of those problems in appropriate function spaces. A highlight of this presentation is the large number and variety of examples introduced to illustrate the connection between the theory of nonlinear operators and partial differential equations. These include primarily semilinear or quasilinear equations of elliptic or of parabolic type, degenerate cases with change of type, related systems and variational inequalities, and spatial boundary conditions of the usual Dirichlet, Neumann, Robin or dynamic type. The discussions of evolution equations include the usual initial-value problems as well as periodic or more general nonlocal constraints, history-value problems, those which may change type due to a possibly vanishing coefficient of the time derivative, and other implicit evolution equations or systems including hysteresis models. The scalar conservation law and semilinear wave equations are briefly mentioned, and hyperbolic systems arising from vibrations of elastic-plastic rods are developed. The origins of a representative sample of such problems are given in the appendix.

Introduction to Banach Spaces: Analysis and Probability: Cambridge University Press

Since its development by Leray and Schauder in the 1930's, degree theory in Banach spaces has proved to be an important tool in tackling many analytic problems, including boundary value problems in ordinary and partial differential equations, integral equations, and eigenvalue and bifurcation problems. With this volume E. H. Rothe provides a largely self-contained introduction to topological degree theory, with an emphasis on its function-analytical aspects. He develops the definition and properties of the degree as much as possible directly in Banach space, without recourse to finite-dimensional theory. A basic tool used is a homotopy theorem for certain linear maps in Banach spaces which allows one to generalize the distinction between maps with positive determinant and those with negative determinant in finite-dimensional spaces. Rothe's book is addressed to graduate students who may have only a rudimentary knowledge of Banach space theory. The first chapter on function-analytic preliminaries provides most of the necessary background. For the benefit of less experienced mathematicians, Rothe introduces the topological tools (subdivision and simplicial approximation, for example) only to the degree of abstraction necessary for the purpose at hand. Readers will gain insight into the various aspects of degree theory, experience in function-analytic thinking, and a theoretic base for applying degree theory to analysis. Rothe describes the various approaches that have historically been taken towards degree theory, making the relationships between these approaches clear. He treats the differential method, the simplicial approach introduced by Brouwer in 1911, the Leray-Schauder method (which assumes Brouwer's degree theory for the finite-dimensional space and then uses a limit process in the dimension), and attempts to establish degree theory in Banach spaces intrinsically, by an application of the differential method in the Banach space case.

Differentiability in Banach Spaces, Differential Forms and Applications Springer

From the Preface: ``This textbook has evolved from a set of lecture notes ... In both the course and the book, I have in mind first- or second-year graduate students in Mathematics and related fields such as Physics ... It is necessary for the reader to have a foundation in advanced calculus which includes familiarity with: least upper bound (LUB) and greatest lower bound (GLB), the concept of function, ϵ's and their companion δ's, and basic properties of sequences of real and complex numbers (convergence, Cauchy's criterion, the Weierstrass-Bolzano theorem). It is not presupposed that the reader is acquainted with vector spaces ... , matrices ... , or determinants ... There are over four hundred exercises, most of them easy ... It is my hope that this book, aside from being an exposition of certain basic material on Hilbert space, may also serve as an introduction to other areas of functional analysis.''

An Introductory Course in Functional Analysis American Mathematical Soc.

This two-volume text provides a complete overview of the theory of Banach spaces, emphasising its interplay with classical and harmonic analysis (particularly Sidon sets) and probability. The authors give a full exposition of all results, as well as numerous exercises and comments to complement the text and aid graduate students in functional analysis. The book will also be an invaluable reference volume for researchers in analysis. Volume 1 covers the basics of Banach space theory, operatory theory in Banach spaces, harmonic analysis and probability. The authors also provide an annex devoted to compact Abelian groups. Volume 2 focuses on applications of the tools presented in the first volume, including Dvoretzky's theorem, spaces without the approximation property, Gaussian processes, and more. Four leading experts also provide surveys outlining major developments in the field since the publication of the original French edition.

Introduction to Tensor Products of Banach Spaces Springer Science & Business Media

Series of scalars, vectors, or functions are among the fundamental objects of mathematical analysis. When the arrangement of the terms is fixed, investigating a series amounts to investigating the sequence of its partial sums. In this case the theory of series is a part of the theory of sequences, which deals with their convergence, asymptotic behavior, etc. The specific character of the theory of series manifests itself when one considers rearrangements (permutations) of the terms of a series, which brings combinatorial considerations into the problems studied. The phenomenon that a numerical series can change its sum when the order of its terms is changed is one of the most impressive facts encountered in a university analysis course. The present book is devoted precisely to this aspect of the theory of series whose terms are elements of Banach (as well as other topological linear) spaces. The exposition focuses on two complementary problems. The first is to char acterize those series in a given space that remain convergent (and have the same sum) for any rearrangement of their terms; such series are usually called uncon ditionally convergent. The second problem is, when a series converges only for certain rearrangements of its terms (in other words, converges conditionally), to describe its sum range, i.e., the set of sums of all its convergent rearrangements.

Functional Analysis Springer

Banach spaces provide a framework for linear and nonlinear functional analysis, operator theory, abstract analysis, probability, optimization and other branches of mathematics. This book introduces the reader to linear functional analysis and to related parts of infinite-dimensional Banach space theory. Key Features: - Develops classical theory, including weak topologies, locally convex space, Schauder bases and compact operator theory - Covers Radon-Nikodým property, finite-dimensional spaces and local theory on tensor products - Contains sections on uniform homeomorphisms and non-linear theory, Rosenthal's L1 theorem, fixed points, and more - Includes information about further topics and directions of research and some open problems at the end of each chapter - Provides numerous exercises for practice The text is suitable for graduate courses or for independent study. Prerequisites include basic courses in calculus and linear. Researchers in functional analysis will also benefit for this book as it can serve as a reference book.