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# Local Theory Of Banach Spaces Nyu Courant

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Handbook of the Geometry of Banach Spaces  
 Geometric Aspects of Functional Analysis  
 Geometry of Banach Spaces  
 Probability in Banach Spaces  
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 Topics in the Local Theory of Banach Spaces and Nest Algebras  
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## ASHER ALEXZANDER

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[Handbook of the Geometry of Banach Spaces](#) Springer

This first volume of a two-volume overview covers the basic theory of Banach spaces, harmonic analysis and probability.

[Geometric Aspects of Functional Analysis](#) Springer Science & Business Media

A comprehensive overview of modern Banach space theory.

*Geometry of Banach Spaces* Cambridge University Press

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.

**Probability in Banach Spaces** Springer As in the previous Seminar Notes, the

current volume reflects general trends in the study of Geometric Aspects of Functional Analysis, understood in a broad sense. A classical theme in the Local Theory of Banach Spaces which is well represented in this volume is the identification of lower-dimensional structures in high-dimensional objects. More recent applications of high-dimensionality are manifested by contributions in Random Matrix Theory, Concentration of Measure and Empirical Processes. Naturally, the Gaussian measure plays a central role in many of these topics, and is also studied in this volume; in particular, the recent breakthrough proof of the Gaussian Correlation Conjecture is revisited. The interplay of the theory with Harmonic and Spectral Analysis is also well apparent in several contributions. The classical relation to both the primal and dual Brunn-

Minkowski theories is also well represented, and related algebraic structures pertaining to valuations and valent functions are discussed. All contributions are original research papers and were subject to the usual refereeing standards.

**Banach Space Theory** American Mathematical Society  
Handbook of the Geometry of Banach Spaces

**Topics in the Local Theory of Banach Spaces and Nest Algebras** Cambridge University Press

Continuing the theme of the previous volumes, these seminar notes reflect general trends in the study of Geometric Aspects of Functional Analysis, understood in a broad sense. Two classical topics represented are the Concentration of Measure Phenomenon in the Local Theory of Banach Spaces, which has recently had triumphs in Random Matrix Theory, and the Central Limit Theorem, one of the earliest examples of regularity and order in high dimensions. Central to the text is the study of the Poincaré and log-Sobolev functional inequalities, their reverses, and other inequalities, in which a crucial role is often played by convexity assumptions such as Log-Concavity. The concept and properties of Entropy form an important subject, with Bourgain's slicing problem and its variants drawing much attention. Constructions related to Convexity Theory are proposed and revisited, as well as inequalities that go beyond the Brunn-Minkowski theory. One of the major current research directions addressed is the identification of lower-dimensional structures with remarkable properties in rather arbitrary high-dimensional objects. In addition to functional analytic results, connections to Computer Science and to Differential Geometry are also discussed.

**Lectures on Amenability** Springer

This volume reflects the progress made in many branches of recent research in Banach space theory and illustrates its interplay with other areas of analysis. Classical Banach Spaces I Springer Science & Business Media

This is the third published volume of the proceedings of the Israel Seminar on Geometric Aspects of Functional Analysis. The large majority of the papers in this volume are original research papers. There was last year a strong emphasis on classical finite-dimensional convexity theory and its connection with Banach space theory. In recent years, it has become evident that the notions and results of the local theory of Banach spaces are useful in solving classical questions in convexity theory. The present

volume contributes to clarifying this point. In addition this volume contains basic contributions to ergodic theory, invariant subspace theory and qualitative differential geometry.

Geometric Aspects of Functional Analysis Elsevier

This is an collection of some easily-formulated problems that remain open in the study of the geometry and analysis of Banach spaces. Assuming the reader has a working familiarity with the basic results of Banach space theory, the authors focus on concepts of basic linear geometry, convexity, approximation, optimization, differentiability, renormings, weak compact generating, Schauder bases and biorthogonal systems, fixed points, topology and nonlinear geometry. The main purpose of this work is to help in convincing young researchers in Functional Analysis that the theory of Banach spaces is a fertile field of research, full of interesting open problems. Inside the Banach space area, the text should help expose young researchers to the depth and breadth of the work that remains, and to provide the perspective necessary to choose a direction for further study. Some of the problems are longstanding open problems, some are recent, some are more important and some are only local problems. Some would require new ideas, some may be resolved with only a subtle combination of known facts. Regardless of their origin or longevity, each of these problems documents the need for further research in this area.

History of Banach Spaces and Linear Operators Springer Science & Business Media

Continuing the theme of the previous volumes, these seminar notes reflect general trends in the study of Geometric Aspects of Functional Analysis, understood in a broad sense. Two classical topics represented are the Concentration of Measure Phenomenon in the Local Theory of Banach Spaces, which has recently had triumphs in Random Matrix Theory, and the Central Limit Theorem, one of the earliest examples of regularity and order in high dimensions. Central to the text is the study of the Poincaré and log-Sobolev functional inequalities, their reverses, and other inequalities, in which a crucial role is often played by convexity assumptions such as Log-Concavity. The concept and properties of Entropy form an important subject, with Bourgain's slicing problem and its variants drawing much attention. Constructions related to Convexity Theory are proposed and revisited, as well as inequalities that go beyond the

Brunn-Minkowski theory. One of the major current research directions addressed is the identification of lower-dimensional structures with remarkable properties in rather arbitrary high-dimensional objects. In addition to functional analytic results, connections to Computer Science and to Differential Geometry are also discussed. *Martingales in Banach Spaces* North Holland

The theory of operator spaces is very recent and can be described as a non-commutative Banach space theory. An 'operator space' is simply a Banach space with an embedding into the space  $B(H)$  of all bounded operators on a Hilbert space  $H$ . The first part of this book is an introduction with emphasis on examples that illustrate various aspects of the theory. The second part is devoted to applications to  $C^*$ -algebras, with a systematic exposition of tensor products of  $C^*$ -algebras. The third (and shorter) part of the book describes applications to non self-adjoint operator algebras, and similarity problems. In particular the author's counterexample to the 'Halmos problem' is presented, as well as work on the new concept of 'length' of an operator algebra. Graduate students and professional mathematicians interested in functional analysis, operator algebras and theoretical physics will find that this book has much to offer.

*Geometric Aspects of Functional Analysis* Cambridge University Press

This volume contains the proceedings of the International Workshop on Banach Space Theory, held at the Universidad de Los Andes in Merida, Venezuela in January 1992. These refereed papers contain the newest results in Banach space theory, real or complex function spaces, and nonlinear functional analysis. There are several excellent survey papers, including ones on homogeneous Banach spaces and applications of probability inequalities, in addition to an important research paper on the distortion problem. This volume is notable for the breadth of the mathematics presented.

*Orthonormal Systems and Banach Space Geometry* Springer

Isoperimetric, measure concentration and random process techniques appear at the basis of the modern understanding of Probability in Banach spaces. Based on these tools, the book presents a complete treatment of the main aspects of Probability in Banach spaces (integrability and limit theorems for vector valued random variables, boundedness and continuity of random processes) and of some of their links to Geometry of Banach spaces (via the type and cotype

properties). Its purpose is to present some of the main aspects of this theory, from the foundations to the most important achievements. The main features of the investigation are the systematic use of isoperimetry and concentration of measure and abstract random process techniques (entropy and majorizing measures). Examples of these probabilistic tools and ideas to classical Banach space theory are further developed.

Banach Spaces of Analytic Functions and Absolutely Summing Operators Cambridge University Press

This book deals with the geometrical structure of finite dimensional normed spaces, as the dimension grows to infinity. This is a part of what came to be known as the Local Theory of Banach Spaces (this name was derived from the fact that in its first stages, this theory dealt mainly with relating the structure of infinite dimensional Banach spaces to the structure of their lattice of finite dimensional subspaces). Our purpose in this book is to introduce the reader to some of the results, problems, and mainly methods developed in the Local Theory, in the last few years. This by no means is a complete survey of this wide area. Some of the main topics we do not discuss here are mentioned in the Notes and Remarks section. Several books appeared recently or are going to appear shortly, which cover much of the material not covered in this book. Among these are Pisier's [Pis6] where factorization theorems related to Grothendieck's theorem are extensively discussed, and Tomczak-Jaegermann's [T-J] where operator ideals and distances between finite dimensional normed spaces are studied in detail. Another related book is Pietch's [Pie].

**Weak cotype and weak type in the local theory of Banach spaces** Walter de Gruyter GmbH & Co KG

This book is a continuation of *Asymptotic Geometric Analysis, Part I*, which was published as volume 202 in this series. Asymptotic geometric analysis studies properties of geometric objects, such as normed spaces, convex bodies, or convex functions, when the dimensions of these objects increase to infinity. The asymptotic approach reveals many very novel phenomena which influence other fields in mathematics, especially where a large data set is of main concern, or a number of parameters which becomes uncontrollably large. One of the important features of this new theory is in developing tools which allow studying high parametric families. Among the topics covered in the book are measure concentration, isoperimetric constants of

log-concave measures, thin-shell estimates, stochastic localization, the geometry of Gaussian measures, volume inequalities for convex bodies, local theory of Banach spaces, type and cotype, the Banach-Mazur compactum, symmetrizations, restricted invertibility, and functional versions of geometric notions and inequalities.

Asymptotic Theory of Finite Dimensional Normed Spaces Springer Science & Business Media

A self-contained presentation of results relating the volume of convex bodies and Banach space geometry.

Factorization of Linear Operators and Geometry of Banach Spaces Springer Nature

Written by a distinguished specialist in functional analysis, this book presents a comprehensive treatment of the history of Banach spaces and (abstract bounded) linear operators. Banach space theory is presented as a part of a broad mathematics context, using tools from such areas as set theory, topology, algebra, combinatorics, probability theory, logic, etc. Equal emphasis is given to both spaces and operators. The book may serve as a reference for researchers and as an introduction for graduate students who want to learn Banach space theory with some historical flavor.

Methods in Banach Space Theory Springer Nature

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.

**Asymptotic Geometric Analysis, Part II** American Mathematical Soc.

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  $L_p$  (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*

Banach Spaces Cambridge University Press

This book surveys the considerable progress made in Banach space theory as a result of Grothendieck's fundamental paper "Resume De la Theorie Metrique des Produits Tensoriels Topologiques". The author examines the central question of which Banach spaces  $X$  and  $Y$  have the property that every bounded operator from  $X$  to  $Y$  factors through a Hilbert space, in particular when the operators are defined on a Banach lattice, a  $C^*$ -algebra or the disc algebra and  $H^\infty$ . He reviews the six problems posed at the end of Grothendieck's paper, which have now all been solved (except perhaps the exact value of Grothendieck's constant), and includes the various results which led to their solution. The last chapter contains the author's construction of several Banach spaces such that the injective and projective tensor products coincide; this gives a negative solution to Grothendieck's sixth problem. Although the book is aimed at mathematicians working in functional analysis, harmonic analysis and operator algebras, its detailed and self-contained treatment makes the material accessible to nonspecialists with a grounding in basic functional analysis. In fact, the author is particularly concerned to develop very recent results in the geometry of Banach spaces in a form that emphasizes how they may be applied in

other fields, such as harmonic analysis and  $C^*$ -algebras.

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