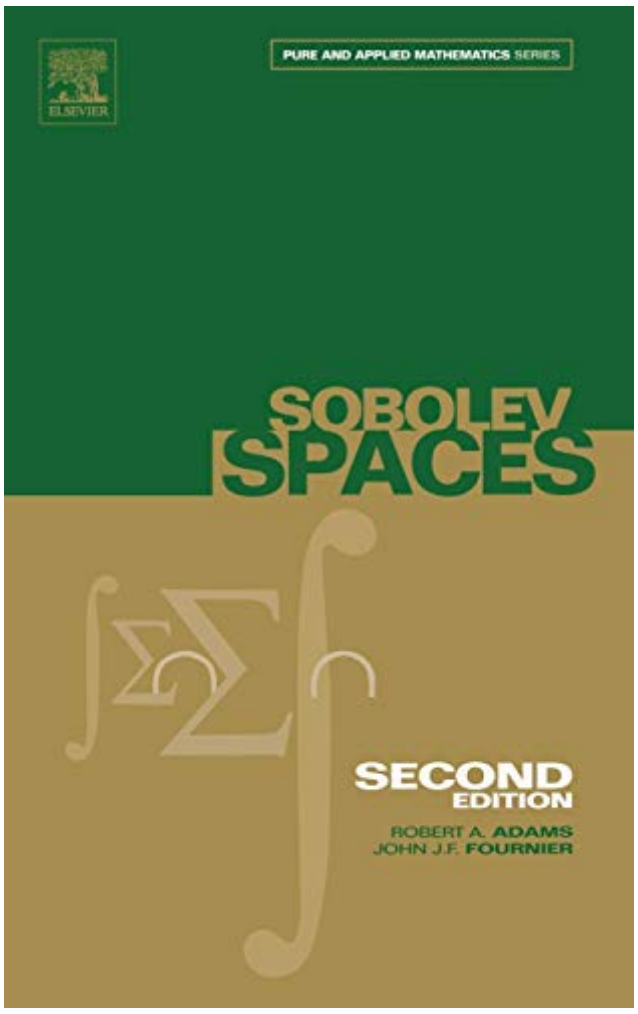

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Sobolev Spaces-Robert A. Adams 2003-06-26 Sobolev Spaces presents an introduction to the theory of Sobolev Spaces and other related spaces of function, also to the imbedding characteristics of these spaces. This theory is widely used in pure and Applied Mathematics and in the Physical Sciences. This second edition of Adam's 'classic' reference text contains many additions and much modernizing and refining of material. The basic premise of the book remains unchanged: Sobolev Spaces is intended to provide a solid foundation in these spaces for graduate students and researchers alike. Self-contained and accessible for readers in other disciplines Written at elementary level making it accessible to graduate students

Sobolev Spaces-Robert A. Adams 2003-07-15 Sobolev Spaces presents an introduction to the theory of Sobolev Spaces and other related spaces of function, also to the imbedding characteristics of these spaces. This theory is widely used in pure and Applied Mathematics and in the Physical Sciences. This second edition of Adam's 'classic' reference text contains many additions and much modernizing and refining of material. The basic premise of the book remains unchanged: Sobolev Spaces is intended to provide a solid foundation in these spaces for graduate students and researchers alike. Self-contained and accessible for readers in other disciplines Written at elementary level making it accessible to graduate students

Sobolev Spaces- 2003

A First Course in Sobolev Spaces-Giovanni Leoni 2009 Sobolev spaces are a fundamental tool in the modern study of partial differential equations. In this book, Leoni takes a novel approach to the theory by looking at Sobolev spaces as the natural development of monotone, absolutely continuous, and BV functions of one variable. In this way, the majority of the text can be read without the prerequisite of a course in functional analysis. The first part of this text is devoted to studying functions of one variable. Several of the topics treated occur in courses on real analysis or measure theory. Here, the perspective emphasizes their applications to Sobolev functions, giving a very different flavor to the treatment. This elementary start to the book makes it suitable for advanced undergraduates or beginning graduate students. Moreover, the one-variable part of the book helps to develop a solid background that facilitates the reading and understanding of Sobolev functions of several variables. The second part of the book is more classical, although it also contains some recent results. Besides the standard results on Sobolev functions, this part of the book includes chapters on BV functions, symmetric rearrangement, and Besov spaces. The book contains over 200 exercises.

Sobolev Spaces-Vladimir Maz'ya 2013-12-21 The Sobolev spaces, i. e. the classes of functions with derivatives in L , occupy p an outstanding place in analysis. During the last two decades a substantial contribution to the study of these spaces has been made; so now solutions to many important problems connected with them are known. In the present monograph we consider various aspects of Sobolev space theory. Attention is paid mainly to the so called imbedding theorems. Such theorems, originally established by S. L. Sobolev in the 1930s, proved to be a useful tool in functional analysis and in the theory of linear and nonlinear par tial differential equations. We list some questions considered in this book. 1. What are the requirements on the measure f1, for the inequality q

An Introduction to Sobolev Spaces and Interpolation Spaces-Luc Tartar 2007-05-26 After publishing an introduction to the Navier–Stokes equation and oceanography (Vol. 1 of this series), Luc Tartar follows with another set of lecture notes based on a graduate course in two parts, as indicated by the title. A draft has been available on the internet for a few years. The author has now revised and polished it into a text accessible to a larger audience.

Functional Analysis, Sobolev Spaces and Partial Differential Equations-Haim Brezis 2010-11-02 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.

Lebesgue and Sobolev Spaces with Variable Exponents-Lars Diening 2011-03-29 The field of variable exponent function spaces has witnessed an explosive growth in recent years. The standard reference article for basic properties is already 20 years old. Thus this self-contained monograph collecting all the basic properties of variable exponent Lebesgue and Sobolev spaces is timely and provides a much-needed accessible reference work utilizing consistent notation and terminology. Many results are also provided with new and improved proofs. The book also presents a number of applications to PDE and fluid dynamics.

Partial Differential Equations: Modeling, Analysis and Numerical Approximation-Hervé Le Dret 2016-02-11 This book is devoted to the study of partial differential equation problems both from the theoretical and numerical points of view. After presenting modeling aspects, it develops the theoretical analysis of partial differential equation problems for the three main classes of partial differential equations: elliptic, parabolic and hyperbolic. Several numerical approximation methods adapted to each of these examples are analyzed: finite difference, finite element and finite volumes methods, and they are illustrated using numerical simulation results. Although parts of the book are accessible to Bachelor students in mathematics or engineering, it is primarily aimed at Masters students in applied mathematics or computational engineering. The emphasis is on mathematical detail and rigor for the analysis of both continuous and discrete problems.

Morrey Spaces-Yoshihiro Sawano 2020-09-17 Morrey spaces were introduced by Charles Morrey to investigate the local behaviour of solutions to second order elliptic partial differential equations. The technique is very useful in many areas in mathematics, in particular in harmonic analysis, potential theory, partial differential equations and mathematical physics. Across two volumes, the authors of Morrey Spaces: Introduction and Applications to Integral Operators and PDE’s discuss the current state of art and perspectives of developments of this theory of Morrey spaces, with the emphasis in Volume I focused mainly on harmonic analysis. Features Provides a ‘from-scratch’ overview of the topic readable by anyone with an understanding of integration theory Suitable for graduate students, masters course students, and researchers in PDE's or Geometry Replete with exercises and examples to aid the reader’s understanding

Introduction to the Theory of Distributions-F. G. Friedlander 1998 A new edition of a classic graduate text on the theory of distributions.

An Introduction to the Theory of Reproducing Kernel Hilbert Spaces-Vern I. Paulsen 2016-04-11 Reproducing kernel Hilbert spaces have

developed into an important tool in many areas, especially statistics and machine learning, and they play a valuable role in complex analysis, probability, group representation theory, and the theory of integral operators. This unique text offers a unified overview of the topic, providing detailed examples of applications, as well as covering the fundamental underlying theory, including chapters on interpolation and approximation, Cholesky and Schur operations on kernels, and vector-valued spaces. Self-contained and accessibly written, with exercises at the end of each chapter, this unrivalled treatment of the topic serves as an ideal introduction for graduate students across mathematics, computer science, and engineering, as well as a useful reference for researchers working in functional analysis or its applications.

Sobolev Spaces on Metric Measure Spaces-Assistant Professor of Mathematics Juha Heinonen 2015-02-05 This coherent treatment from first principles is an ideal introduction for graduate students and a useful reference for experts.

Nonlinear Functional Analysis-Jacob T. Schwartz 1969

Lectures on Elliptic Boundary Value Problems-Shmuel Agmon 2010-02-03 This book, which is a new edition of a book originally published in 1965, presents an introduction to the theory of higher-order elliptic boundary value problems. The book contains a detailed study of basic problems of the theory, such as the problem of existence and regularity of solutions of higher-order elliptic boundary value problems. It also contains a study of spectral properties of operators associated with elliptic boundary value problems. Weyl's law on the asymptotic distribution of eigenvalues is studied in great generality.

Nonlocal Modeling, Analysis, and Computation-Qiang Du 2019-03-20 Studies of complexity, singularity, and anomaly using nonlocal continuum models are steadily gaining popularity. This monograph provides an introduction to basic analytical, computational, and modeling issues and to some of the latest developments in these areas. Nonlocal Modeling, Analysis, and Computation includes motivational examples of nonlocal models, basic building blocks of nonlocal vector calculus, elements of theory for well-posedness and nonlocal spaces, connections to and coupling with local models, convergence and compatibility of numerical approximations, and various applications, such as nonlocal dynamics of anomalous diffusion and nonlocal peridynamic models of elasticity and fracture mechanics. A particular focus is on nonlocal systems with a finite range of interaction to illustrate their connection to local partial differential equations and fractional PDEs. These models are designed to represent nonlocal interactions explicitly and to remain valid for complex systems involving possible singular solutions and they have the potential to be alternatives for as well as bridges to existing models. The author discusses ongoing studies of nonlocal models to encourage the discovery of new mathematical theory for nonlocal continuum models and offer new perspectives on traditional models, analytical techniques, and algorithms.

The Cahn–Hilliard Equation: Recent Advances and Applications-Alain Miranville 2019-09-09 This is the first book to present a detailed discussion of both classical and recent results on the popular Cahn–Hilliard equation and some of its variants. The focus is on mathematical analysis of Cahn–Hilliard models, with an emphasis on thermodynamically relevant logarithmic nonlinear terms, for which several questions are still open. Initially proposed in view of applications to materials science, the Cahn–Hilliard equation is now applied in many other areas, including image processing, biology, ecology, astronomy, and chemistry. In particular, the author addresses applications to image inpainting and tumor growth. Many chapters include open problems and directions for future research. The Cahn-Hilliard Equation: Recent Advances and Applications is intended for graduate students and researchers in applied mathematics, especially those interested in phase separation models and their generalizations and applications to other fields. Materials scientists also will find this text of interest.

Measure Theory and Integration-Michael Eugene 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 ofdifferential 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.

Inverse Problem Theory and Methods for Model Parameter Estimation-Albert Tarantola 2005-01-01 While the prediction of observations is a forward problem, the use of actual observations to infer the properties of a model is an inverse problem. Inverse problems are difficult because they may not have a unique solution. The description of uncertainties plays a central role in the theory, which is based on probability theory. This book proposes a general approach that is valid for linear as well as for nonlinear problems. The philosophy is essentially probabilistic and allows the reader to understand the basic difficulties appearing in the resolution of inverse problems. The book attempts to explain how a method of acquisition of information can be applied to actual real-world problems, and many of the arguments are heuristic.

Comparison Geometry-Karsten Grove 1997-05-13 This is an up to date work on a branch of Riemannian geometry called Comparison Geometry.

Problems on Partial Differential Equations-Maciej Borodzik 2019-05-07 This book covers a diverse range of topics in Mathematical Physics, linear and nonlinear PDEs. Though the text reflects the classical theory, the main emphasis is on introducing readers to the latest developments based on the notions of weak solutions and Sobolev spaces. In numerous problems, the student is asked to prove a given statement, e.g. to show the existence of a solution to a certain PDE. Usually there is no closed-formula answer available, which is why there is no answer section, although helpful hints are often provided. This textbook offers a valuable asset for students and educators alike. As it adopts a perspective on PDEs that is neither too theoretical nor too practical, it represents the perfect companion to a broad spectrum of courses.

High-Dimensional Probability-Roman Vershynin 2018-09-30 High-dimensional probability offers insight into the behavior of random vectors, random matrices, random subspaces, and objects used to quantify uncertainty in high dimensions. Drawing on ideas from probability, analysis, and geometry, it lends itself to applications in mathematics, statistics, theoretical computer science, signal processing, optimization, and more. It is the first to integrate theory, key tools, and modern applications of high-dimensional probability. Concentration inequalities form the core, and it covers both classical results such as Hoeffding's and Chernoff's inequalities and modern developments such as the matrix Bernstein's inequality. It then introduces the powerful methods based on stochastic processes, including such tools as Slepian's, Sudakov's, and Dudley's inequalities, as well as generic chaining and bounds based on VC dimension. A broad range of illustrations is embedded throughout, including classical and modern results for covariance estimation, clustering, networks, semidefinite programming, coding, dimension reduction, matrix completion, machine learning, compressed sensing, and sparse regression.

Lectures on Kähler Manifolds-Werner Ballmann 2006 These notes are based on lectures the author held at the University of Bonn and the Erwin-Schrodinger-Institute in Vienna. The aim is to give a thorough introduction to the theory of Kahler manifolds with special emphasis on the differential geometric side of Kahler geometry. Some familiarity with global analysis and partial differential equations is assumed, in particular in the part on the Calabi conjecture.

Differentiable Measures and the Malliavin Calculus-Vladimir Igorevich Bogachev 2010-07-21 This book provides the reader with the principal concepts and results related to differential properties of measures on infinite dimensional spaces. In the finite dimensional case such properties are described in terms of densities of measures with respect to Lebesgue measure. In the infinite dimensional case new phenomena arise. For the first time a detailed account is given of the theory of differentiable

measures, initiated by S. V. Fomin in the 1960s; since then the method has found many various important applications. Differentiable properties are described for diverse concrete classes of measures arising in applications, for example, Gaussian, convex, stable, Gibbsian, and for distributions of random processes. Sobolev classes for measures on finite and infinite dimensional spaces are discussed in detail. Finally, we present the main ideas and results of the Malliavin calculus--a powerful method to study smoothness properties of the distributions of nonlinear functionals on infinite dimensional spaces with measures. The target readership includes mathematicians and physicists whose research is related to measures on infinite dimensional spaces, distributions of random processes, and differential equations in infinite dimensional spaces. The book includes an extensive bibliography on the subject.

An Introduction to Measure Theory-Terence Tao 2011-09-14 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 Caratheodory 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.

Evolution Equations-David Ellwood 2013-06-26 This volume is a collection of notes from lectures given at the 2008 Clay Mathematics Institute Summer School, held in Zürich, Switzerland. The lectures were designed for graduate students and mathematicians within five years of the Ph.D., and the main focus of the program was on recent progress in the theory of evolution equations. Such equations lie at the heart of many areas of mathematical physics and arise not only in situations with a manifest time evolution (such as linear and nonlinear wave and Schrödinger equations) but also in the high energy or semi-classical limits of elliptic problems. The three main courses focused primarily on microlocal analysis and spectral and scattering theory, the theory of the nonlinear Schrödinger and wave equations, and evolution problems in general relativity. These major topics were supplemented by several mini-courses reporting on the derivation of effective evolution equations from microscopic quantum dynamics; on wave maps with and without symmetries; on quantum N-body scattering, diffraction of waves, and symmetric spaces; and on nonlinear Schrödinger equations at critical regularity. Although highly detailed treatments of some of these topics are now available in the published literature, in this collection the reader can learn the fundamental ideas and tools with a minimum of technical machinery. Moreover, the treatment in this volume emphasizes common themes and techniques in the field, including exact and approximate conservation laws, energy methods, and positive commutator arguments. Titles in this series are co-published with the Clay Mathematics Institute (Cambridge, MA).

Tools for PDE-Michael E. Taylor 2007 This book develops three related tools that are useful in the analysis of partial differential equations (PDEs), arising from the classical study of singular integral operators: pseudodifferential operators, paradifferential operators, and layer potentials. A theme running throughout the work is the treatment of PDE in the presence of relatively little regularity. The first chapter studies classes of pseudodifferential operators whose symbols have a limited degree of regularity; the second chapter shows how paradifferential operators yield sharp estimates on the action of various nonlinear operators on function spaces. The third chapter applies this material to an assortment of results in PDE, including regularity results for elliptic PDE with rough coefficients, planar fluid flows on rough domains, estimates on Riemannian manifolds given weak bounds on Ricci tensor, div-curl estimates, and results on propagation of singularities for wave equations with rough coefficients. The last chapter studies the method of layer potentials on Lipschitz domains, concentrating on applications to boundary problems for elliptic PDE with variable coefficients.

Orlicz Spaces and Generalized Orlicz Spaces-Petteri Harjulehto 2019-05-07 This book presents a systematic treatment of generalized Orlicz spaces (also known as Musielak–Orlicz spaces) with minimal assumptions on the generating Φ-function. It introduces and develops a technique centered on the use of equivalent Φ-functions. Results from classical functional analysis are presented in detail and new material is included on harmonic analysis. Extrapolation is used to prove, for example, the boundedness of Calderón–Zygmund operators. Finally, central results are provided for Sobolev spaces, including Poincaré and Sobolev–Poincaré inequalities in norm and modular forms. Primarily aimed at researchers and PhD students interested in Orlicz spaces or generalized Orlicz spaces, this book can be used as a basis for advanced graduate courses in analysis.

Solving PDEs in Python-Hans Petter Langtangen 2017-03-21 This book offers a concise and gentle introduction to finite element programming in Python based on the popular FEniCS software library. Using a series of examples, including the Poisson equation, the equations of linear elasticity, the incompressible Navier–Stokes equations, and systems of nonlinear advection–diffusion–reaction equations, it guides readers through the essential steps to quickly solving a PDE in FEniCS, such as how to define a finite variational problem, how to set boundary conditions, how to solve linear and nonlinear systems, and how to visualize solutions and structure finite element Python programs. This book is open access under a CC BY license.

Partial Differential Equations-J. Wloka 1987-05-21 A rigorous introduction to the abstract theory of partial differential equations progresses from the theory of distribution and Sobolev spaces to Fredholm operations, the Schauder fixed point theorem and Bochner integrals.

Hilbert Space Methods in Partial Differential Equations-Ralph E. Showalter 2011-09-12 This graduate-level text opens with an elementary presentation of Hilbert space theory sufficient for understanding the rest of the book. Additional topics include boundary value problems, evolution equations, optimization, and approximation.1979 edition.

The Random Matrix Theory of the Classical Compact Groups-Elizabeth S. Meckes 2019-08-31 This is the first book to provide a comprehensive overview of foundational results and recent progress in the study of random matrices from the classical compact groups, drawing on the subject's deep connections to geometry, analysis, algebra, physics, and statistics. The book sets a foundation with an introduction to the groups themselves and six different constructions of Haar measure. Classical and recent results are then presented in a digested, accessible form, including the following: results on the joint distributions of the entries; an extensive treatment of eigenvalue distributions, including the Weyl integration formula, moment formulae, and limit theorems and large deviations for the spectral measures; concentration of measure with applications both within random matrix theory and in high dimensional geometry; and results on characteristic polynomials with connections to the Riemann zeta function. This book will be a useful reference for researchers and an accessible introduction for students in related fields.

Nonlinear Dirac Equation: Spectral Stability of Solitary Waves-Nabile Boussaïd 2019-11-21 This monograph gives a comprehensive treatment of spectral (linear) stability of weakly relativistic solitary waves in the nonlinear Dirac equation. It turns out that the instability is not an intrinsic property of the Dirac equation that is only resolved in the framework of the second quantization with the Dirac sea hypothesis. Whereas general results about the Dirac-Maxwell and similar equations are not yet available, we can consider the Dirac equation with scalar self-interaction, the model first introduced in 1938. In this book we show that in particular cases solitary waves in this model may be spectrally stable (no linear instability). This result is the first step towards proving asymptotic stability of solitary waves. The book presents the necessary overview of the functional analysis, spectral theory, and the existence and linear stability of solitary waves of the nonlinear Schrödinger equation. It also presents the necessary tools such as the limiting absorption principle and the Carleman estimates in the form applicable to the Dirac operator, and proves the general form of the Dirac-Pauli theorem. All of these results are used to prove the spectral stability of weakly relativistic solitary wave solutions of the nonlinear Dirac equation.

The Radon Transform-Sigurdur Helgason 1999-08-01 The Radon transform is an important topic in integral geometry which deals with the

problem of expressing a function on a manifold in terms of its integrals over certain submanifolds. Solutions to such problems have a wide range of applications, namely to partial differential equations, group representations, X-ray technology, nuclear magnetic resonance scanning, and tomography. This second edition, significantly expanded and updated, presents new material taking into account some of the progress made in the field since 1980. Aimed at beginning graduate students, this monograph will be useful in the classroom or as a resource for self-study. Readers will find here an accessible introduction to Radon transform theory, an elegant topic in integral geometry.

Theory of Sobolev Multipliers-Vladimir Maz'ya 2008-10-13 The first part of this book offers a comprehensive overview of the theory of pointwise multipliers acting in pairs of spaces of differentiable functions. The second part of the book explores several applications of this theory.

A Course on Rough Paths-Peter K. Friz 2020-05-27 With many updates and additional exercises, the second edition of this book continues to provide readers with a gentle introduction to rough path analysis and regularity structures, theories that have yielded many new insights into the analysis of stochastic differential equations, and, most recently, stochastic partial differential equations. Rough path analysis provides the means for constructing a pathwise solution theory for stochastic differential equations which, in many respects, behaves like the theory of deterministic differential equations and permits a clean break between analytical and probabilistic arguments. Together with the theory of regularity structures, it forms a robust toolbox, allowing the recovery of many classical results without having to rely on specific probabilistic properties such as adaptedness or the martingale property. Essentially self-contained, this textbook puts the emphasis on ideas and short arguments, rather than aiming for the strongest possible statements. A typical reader will have been exposed to upper undergraduate analysis and probability courses, with little more than Itô-integration against Brownian motion required for most of the text. From the reviews of the first edition: "Can easily be used as a support for a graduate course ... Presents in an accessible way the unique point of view of two experts who themselves have largely contributed to the theory" - Fabrice Baudouin in the Mathematical Reviews "It is easy to base a graduate course on rough paths on this ... A researcher who carefully works her way through all of the exercises will have a very good impression of the current state of the art" - Nicolas Perkowski in Zentralblatt MATH

Advanced Real Analysis-Anthony W. Knapp 2008-07-11 * Presents a comprehensive treatment with a global view of the subject * Rich in examples, problems with hints, and solutions, the book makes a welcome addition to the library of every mathematician

Hermitian Analysis-John P. D'Angelo 2013-09-24 Hermitian Analysis: From Fourier Series to Cauchy-Riemann Geometry provides a coherent, integrated look at various topics from undergraduate analysis. It begins with Fourier series, continues with Hilbert spaces, discusses the Fourier transform on the real line, and then turns to the heart of the book, geometric considerations. This chapter includes complex differential forms, geometric inequalities from one and several complex variables, and includes some of the author's results. The concept of orthogonality weaves the material into a coherent whole. This textbook will be a useful resource for upper-undergraduate students who intend to continue with mathematics, graduate students interested in analysis, and researchers interested in some basic aspects of CR Geometry. The inclusion of several hundred exercises makes this book suitable for a capstone undergraduate Honors class.

Elliptic Boundary Value Problems on Corner Domains-Monique Dauge 2006-11-14 This research monograph focusses on a large class of variational elliptic problems with mixed boundary conditions on domains with various corner singularities, edges, polyhedral vertices, cracks, slits. In a natural functional framework (ordinary Sobolev Hilbert spaces) Fredholm and semi-Fredholm properties of induced operators are completely characterized. By specially choosing the classes of operators and domains and the functional spaces used, precise and general results may be obtained on the smoothness and asymptotics of solutions. A new type of characteristic condition is introduced which involves the spectrum of associated operator pencils and some ideals of polynomials satisfying some boundary conditions on cones. The methods involve many perturbation arguments and a new use of Mellin transform. Basic knowledge about BVP on smooth domains in Sobolev spaces is the main prerequisite to the understanding of this book. Readers interested in the general theory of corner domains will find here a new basic theory (new approaches and results) as well as a synthesis of many already known results; those who need regularity conditions and descriptions of singularities for numerical analysis will find precise statements and also a means to obtain further one in many explicit situtations.

Qualitative Analysis of Nonlinear Elliptic Partial Differential Equations-Vicentiu D. Radulescu 2008 This book provides a comprehensive introduction to the mathematical theory of nonlinear problems described by elliptic partial differential equations. These equations can be seen as nonlinear versions of the classical Laplace equation, and they appear as mathematical models in different branches of physics, chemistry, biology, genetics, and engineering and are also relevant in differential geometry and relativistic physics. Much of the modern theory of such equations is based on the calculus of variations and functional analysis. Concentrating on single-valued or multivalued elliptic equations with nonlinearities of various types, the aim of this volume is to obtain sharp existence or nonexistence results, as well as decay rates for general classes of solutions. Many technically relevant questions are presented and analyzed in detail. A systematic picture of the most relevant phenomena is obtained for the equations under study, including bifurcation, stability, asymptotic analysis, and optimal regularity of solutions. The method of presentation should appeal to readers with different backgrounds in functional analysis and nonlinear partial differential equations. All chapters include detailed heuristic arguments providing thorough motivation of the study developed later on in the text, in relationship with concrete processes arising in applied sciences. A systematic description of the most relevant singular phenomena described in this volume includes existence (or nonexistence) of solutions, unicity or multiplicity properties, bifurcation and asymptotic analysis, and optimal regularity. The book includes an extensive bibliography and a rich index, thus allowing for quick orientation among the vast collection of literature on the mathematical theory of nonlinear phenomena described by elliptic partial differential equations.