Differential Calculus In Normed Linear Spaces Texts And Readings In Mathematics 26

The Calculus of Variations
Calculus on Normed Vector Spaces
Analysis in Euclidean Space
Analysis
Differential Calculus in Topological Linear Spaces
Geometry of Normed Linear Spaces
A Problems Based Course in Advanced Calculus
Mathematical Analysis and the Mathematics of Computation
Introduction to Functional Analysis, Banach Spaces, and Differential Calculus
Differential Calculus on Normed Spaces
Introduction to the Analysis of Normed Linear Spaces
Advanced Calculus
Best Approximation in Normed Linear Spaces by Elements of Linear Subspaces
Differential Calculus and Its Applications
Linear and Nonlinear Functional Analysis with Applications
Classical Analysis on Normed Spaces
Differential Calculas in Normed Linear Spaces
Advanced Calculus of Several Variables
Methods of Nonlinear Analysis
Holomorphy and Calculus in Normed SPates
Linear Functional Analysis
Calculus in Vector Spaces
Calculus in Vector Spaces, Second Edition, Revised Expanded
Differential Analysis
Methods of Nonlinear Analysis
Nonlinear Functional Analysis and Applications
Linear Functional Analysis
Differential Calculus
Advanced Calculus
Local Analysis
Convex Functional Analysis
Advanced Calculus with Linear Analysis
Differential Calculus
Elements Of Linear And Multilinear Algebra
Differential Calculus in Normed Linear Spaces
Analysis in Vector Spaces
Calculus in Vector Spaces, Revised Expanded
Banach, Frechet, Hilbert and Neumann Spaces

Applied Analysis
Calculus in Vector Spaces without Norm

GUADALUPE CHAVEZ

The Calculus of Variations Springer
T. M. Flett was a Professor of Pure Mathematics at the University of Sheffield from 1967 until his death in 1976. This book, which he had almost finished, has been edited for publication by Professor J. S. Pym. This text is a treatise on the differential calculus of functions taking values in normed spaces. The exposition is essentially elementary, though on are occasions appeal is made to deeper results. The theory of vector-valued functions of one real variable is particularly straightforward, and this forms the substance of the initial chapter. A large part of the book is devoted to applications. An extensive study is made of ordinary differential equations. Extremum problems for functions of a vector variable lead to the calculus of variations and general optimisation problems. Other applications include the geometry of tangents and the Newton-Kantorovich method in normed spaces. The three historical notes show how the masters of the past (Cauchy, Peano...) created the subject by examining in depth the evolution of certain theories and proofs.
Calculus on Normed Vector Spaces SIAM
Suitable for advanced undergraduate and graduate students of mathematics, physics, or engineering, this introduction to the calculus of variations focuses on variational problems involving one independent variable. It also discusses more advanced topics such as the inverse problem, eigenvalue problems, and Noether’s theorem. The text includes numerous examples along with problems to help students consolidate the material.
Analysis in Euclidean Space Springer
This single-volume textbook covers the fundamentals of linear and nonlinear functional analysis, illustrating most of the basic theorems with numerous applications to linear and nonlinear partial differential equations and to selected topics from numerical analysis and optimization theory. This book has pedagogical appeal because it features self-contained and complete proofs of most of the theorems, some of which are not always easy to locate in the literature or are difficult to reconstitute. It also offers 401 problems and 52 figures, plus historical notes and many original references that provide an idea of the genesis of the important results, and it covers most of the core topics from functional analysis.
Analysis World Scientific Publishing Company
This classic and long out of print text by the famous French mathematician Henri Cartan, has finally been retitled and reissued as an unabridged reprint of the Kershaw Publishing Company 1971 edition at remarkably low price for a new generation of university students and teachers. It provides a concise and beautifully written course on rigorous analysis. Unlike most similar texts, which usually develop the theory in either metric or Euclidean spaces, Cartan's text is set entirely in normed vector spaces, particularly Banach spaces. This not only allows the author to develop carefully the concepts of calculus in a setting of maximal generality, it allows him to unify both single and multivariable calculus over either the real or complex scalar fields by considering derivatives of nth orders as linear transformations. This prepares the student for the subsequent study of differentiable manifolds modeled on Banach spaces as well as graduate analysis courses, where normed spaces and their isomorphisms play a central role. More importantly, it's republication in an inexpensive edition finally makes available again the English translations of both long separated halves of Cartan's famous 1965-6 analysis course at the University of Paris: The second half has been in print for over a decade as Differential Forms , published by Dover Books. Without the first half, it has been very difficult for readers of that second half text to be prepared with the proper prerequisites as Cartan originally intended. With both texts now available at very affordable prices, the entire course can now be easily obtained and studied as it was originally intended. The book is divided into two chapters. The first develops the abstract differential calculus. After an introductory section providing the necessary background on the elements of Banach spaces, the Frechet derivative is defined, and proofs are given of the two basic theorems of differential calculus: The mean value theorem and the inverse function theorem. The chapter proceeds with the introduction and study of higher order derivatives and a proof of Taylor's formula. It closes with a study of local maxima and minima including both necessary and sufficient conditions for the existence of such minima. The second chapter is devoted to differential equations. Then the general existence and uniqueness theorems for ordinary differential equations on Banach spaces are proved. Applications of this material to linear equations and to obtaining various properties of solutions of differential equations are then given. Finally the relation between partial differential equations of the first order and ordinary differential equations is discussed. The prerequisites are rigorous first courses in calculus on the real line (elementary analysis), linear algebra on abstract vectors spaces with linear transformations and the basic definitions of topology (metric spaces, topology,etc.) A basic course in differential equations is advised as well. Together with its' sequel, Differential Calculus On Normed Spaces forms the basis for an outstanding advanced undergraduate/first year graduate analysis course in the Bourbakian French tradition of Jean Dieudonn&#65533;'s Foundations of Modern Analysis, but a more accessible level and much more affordable then that classic.
Differential Calculus in Topological Linear Spaces Springer Science & Business Media
This book provides an introduction to the ideas and methods of linear func tional analysis at a level appropriate to the final year of an undergraduate course at a British university. The prerequisites for reading it are a standard undergraduate knowledge of linear algebra and real analysis (including the the ory of metric spaces). Part of the development of functional analysis can be traced to attempts to find a suitable framework in which to discuss differential and integral equa tions. Often, the appropriate setting turned out to be a vector space of real or complex-valued functions defined on some set. In general, such a vector space is infinite-dimensional. This leads to difficulties in that, although many of the elementary properties of finite-dimensional vector spaces hold in infinite

dimensional vector spaces, many others do not. For example, in general infinite dimensional vector spaces there is no framework in which to make sense of an alytic concepts such as convergence and continuity. Nevertheless, on the spaces of most interest to us there is often a norm (which extends the idea of the length of a vector to a somewhat more abstract setting). Since a norm on a vector space gives rise to a metric on the space, it is now possible to do analysis in the space. As real or complex-valued functions are often called functionals, the term functional analysis came to be used for this topic. We now briefly outline the contents of the book.

Geometry of Normed Linear Spaces Springer

In this book, the basic methods of nonlinear analysis are emphasized and illustrated in simple examples. Every considered method is motivated, explained in a general form but in the simplest possible abstract framework. Its applications are shown, particularly to boundary value problems for elementary ordinary or partial differential equations. The text is organized in two levels: a self-contained basic and, organized in appendices, an advanced level for the more experienced reader. Exercises are an organic part of the exposition and accompany the reader throughout the book.

A Problems Based Course in Advanced Calculus Elsevier

An authorised reissue of the long out of print classic textbook, Advanced Calculus by the late Dr Lynn Loomis and Dr Shlomo Sternberg both of Harvard University has been a revered but hard to find textbook for the advanced calculus course for decades. This book is based on an honors course in advanced calculus that the authors gave in the 1960's. The foundational material, presented in the unstarred sections of Chapters 1 through 11, was normally covered, but different applications of this basic material were stressed from year to year, and the book therefore contains more material than was covered in any one year. It can accordingly be used (with omissions) as a text for a year's course in advanced calculus, or as a text for a three-semester introduction to analysis. The prerequisites are a good grounding in the calculus of one variable from a mathematically rigorous point of view, together with some acquaintance with linear algebra. The reader should be familiar with limit and continuity type arguments and have a certain amount of mathematical sophistication. As possible introductory texts, we mention Differential and Integral Calculus by R Courant, Calculus by T Apostol, Calculus by M Spivak, and Pure Mathematics by G Hardy. The reader should also have some experience with partial derivatives. In overall plan the book divides roughly into a first half which develops the calculus (principally the differential calculus) in the setting of normed vector spaces, and a second half which deals with the calculus of differentiable manifolds.

Mathematical Analysis and the Mathematics of Computation Springer

Advanced Calculus of Several Variables provides a conceptual treatment of multivariable calculus. This book emphasizes the interplay of geometry, analysis through linear algebra, and approximation of nonlinear mappings by linear ones. The classical applications and computational methods that are responsible for much of the interest and importance of calculus are also considered. This text is organized into six chapters. Chapter I deals with linear algebra and geometry of Euclidean n-space Rn. The multivariable differential calculus is treated in Chapters II and III, while multivariable integral calculus is covered in Chapters IV and V. The last chapter is devoted to venerable problems of the calculus of variations. This publication is intended for students who have completed a standard introductory calculus sequence.

Introduction to Functional Analysis, Banach Spaces, and Differential Calculus Springer Science & Business Media

Calculus in Vector Spaces addresses linear algebra from the basics to the spectral theorem and examines a range of topics in multivariable calculus. This second edition introduces, among other topics, the derivative as a linear transformation, presents linear algebra in a concrete context based on complementary ideas in calculus, and explains differential forms on Euclidean space, allowing for Green's theorem, Gauss's theorem, and Stokes's theorem to be understood in a natural setting. Mathematical analysts, algebraists, engineers, physicists, and students taking advanced calculus and linear algebra courses should find this book useful.

Differential Calculus on Normed Spaces Academic Press

"This book presents Advanced Calculus from a geometric point of view: instead of dealing with partial derivatives of functions of several variables, the derivative of the function is treated as a linear transformation between normed linear spaces. Not only does this lead to a simplified and transparent exposition of "difficult" results like the Inverse and Implicit Function Theorems but also permits, without any extra effort, a discussion of the Differential Calculus of functions defined on infinite dimensional Hilbert or Banach spaces." "The prerequisites demanded of the reader are modest: a sound understanding of convergence of sequences and series of real numbers, the continuity and differentiability properties of functions of a red variable and a little Linear Algebra should provide adequate background for understanding the book."--BOOK JACKET.

Introduction to the Analysis of Normed Linear Spaces Springer Science & Business Media

Nonlinear Functional Analysis and Applications provides information pertinent to the fundamental aspects of nonlinear functional analysis and its application. This book provides an introduction to the basic concepts and techniques of this field. Organized into nine chapters, this book begins with an overview of the possibilities for applying ideas from functional analysis to problems in analysis. This text then provides a systematic exposition of several aspects of differential calculus in norms and topological linear spaces. Other chapters consider the various settings in nonlinear functional analysis in which differentials play a significant role. This book discusses as well the generalized inverse for a bounded linear operator, whose range is not necessarily closed. The final chapter deals with the equations of hydrodynamics, which are usually highly nonlinear and difficult to solve. This book is a valuable resource for mathematicians. Readers who are interested in nonlinear functional analysis will also find this book useful.

Advanced Calculus John Wiley & Sons

The material is based on courses given by the author at the Universite Pierre et Marie Claude. It includes a bibliography to which reference is made throughout the text.

Best Approximation in Normed Linear Spaces by Elements of Linear Subspaces Routledge

Calculus in Vector Spaces addresses linear algebra from the basics to the spectral theorem and examines a range of topics in multivariable calculus. This second edition introduces, among other topics, the derivative as a linear transformation, presents linear algebra in a concrete context based on complementary ideas in calculus, and explains differential forms on Euclidean space, allowing for Green's theorem, Gauss's theorem, and Stokes's theorem to be understood in a natural setting. Mathematical analysts, algebraists, engineers, physicists, and students taking advanced calculus

and linear algebra courses should find this book useful.

Differential Calculus and Its Applications Springer Science & Business Media

Features an introduction to advanced calculus and highlights its inherent concepts from linear algebra Advanced Calculus reflects the unifying role of linear algebra in an effort to smooth readers' transition to advanced mathematics. The book fosters the development of complete theorem-proving skills through abundant exercises while also promoting a sound approach to the study. The traditional theorems of elementary differential and integral calculus are rigorously established, presenting the foundations of calculus in a way that reorients thinking toward modern analysis. Following an introduction dedicated to writing proofs, the book is divided into three parts: Part One explores foundational one-variable calculus topics from the viewpoint of linear spaces, norms, completeness, and linear functionals. Part Two covers Fourier series and Stieltjes integration, which are advanced one-variable topics. Part Three is dedicated to multivariable advanced calculus, including inverse and implicit function theorems and Jacobian theorems for multiple integrals. Numerous exercises guide readers through the creation of their own proofs, and they also put newly learned methods into practice. In addition, a "Test Yourself" section at the end of each chapter consists of short questions that reinforce the understanding of basic concepts and theorems. The answers to these questions and other selected exercises can be found at the end of the book along with an appendix that outlines key terms and symbols from set theory. Guiding readers from the study of the topology of the real line to the beginning theorems and concepts of graduate analysis, Advanced Calculus is an ideal text for courses in advanced calculus and introductory analysis at the upper-undergraduate and beginning-graduate levels. It also serves as a valuable reference for engineers, scientists, and mathematicians.

Linear and Nonlinear Functional Analysis with Applications Createspace Independent Publishing Platform

These 17 papers result from a 1983 conference held to honor Professor Mahlon Marsh Day upon his retirement from the University of Illinois. Each of the main speakers was invited to take some aspect of Day's pioneering work as a starting point: he was the first American mathematician to study normed spaces from a geometric standpoint and, for a number of years, pioneered American research on the structure of Banach spaces. The material is aimed at researchers and graduate students in functional analysis. Many of the articles are expository and are written for the reader with only a basic background in the theory of normed linear spaces.

Classical Analysis on Normed Spaces World Scientific

This book is the first of a set dedicated to the mathematical tools used in partial differential equations derived from physics. Its focus is on normed or semi-normed vector spaces, including the spaces of Banach, Fréchet and Hilbert, with new developments on Neumann spaces, but also on extractable spaces. The author presents the main properties of these spaces, which are useful for the construction of Lebesgue and Sobolev distributions with real or vector values and for solving partial differential equations. Differential calculus is also extended to semi-normed spaces. Simple methods, semi-norms, sequential properties and others are discussed, making these tools accessible to the greatest number of students – doctoral students, postgraduate students – engineers and researchers without restricting or generalizing the results.

Differential Calculas in Normed Linear Spaces American Mathematical Soc.

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.

Advanced Calculus of Several Variables American Mathematical Soc.

This textbook is suitable for a course in advanced calculus that promotes active learning through problem solving. It can be used as a base for a Moore method or inquiry based class, or as a guide in a traditional classroom setting where lectures are organized around the presentation of problems and solutions. This book is appropriate for any student who has taken (or is concurrently taking) an introductory course in calculus. The book includes sixteen appendices that review some indispensable prerequisites on techniques of proof writing with special attention to the notation used the course.

Methods of Nonlinear Analysis Academic Press

This volume is dedicated to the fundamentals of convex functional analysis. It presents those aspects of functional analysis that are extensively used in various applications to mechanics and control theory. The purpose of the text is essentially two-fold. On the one hand, a bare minimum of the theory required to understand the principles of functional, convex and set-valued analysis is presented. Numerous examples and diagrams provide as intuitive an explanation of the principles as possible. On the other hand, the volume is largely self-contained. Those with a background in graduate mathematics will find a concise summary of all main definitions and theorems.

Holomorphy and Calculus in Normed SPates Springer

In this book, fundamental methods of nonlinear analysis are introduced, discussed and illustrated in straightforward examples. Each method considered is motivated and explained in its general form, but presented in an abstract framework as comprehensively as possible. A large number of methods are applied to boundary value problems for both ordinary and partial differential equations. In this edition we have made minor revisions, added new material and organized the content slightly differently. In particular, we included evolutionary equations and differential equations on manifolds. The applications to partial differential equations follow every abstract framework of the method in question. The text is structured in two levels: a self-contained basic level and an advanced level - organized in appendices - for the more experienced reader. The last chapter contains more involved material and can be skipped by those new to the field. This book serves as both a textbook for graduate-level courses and a reference book for mathematicians, engineers and applied scientists

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