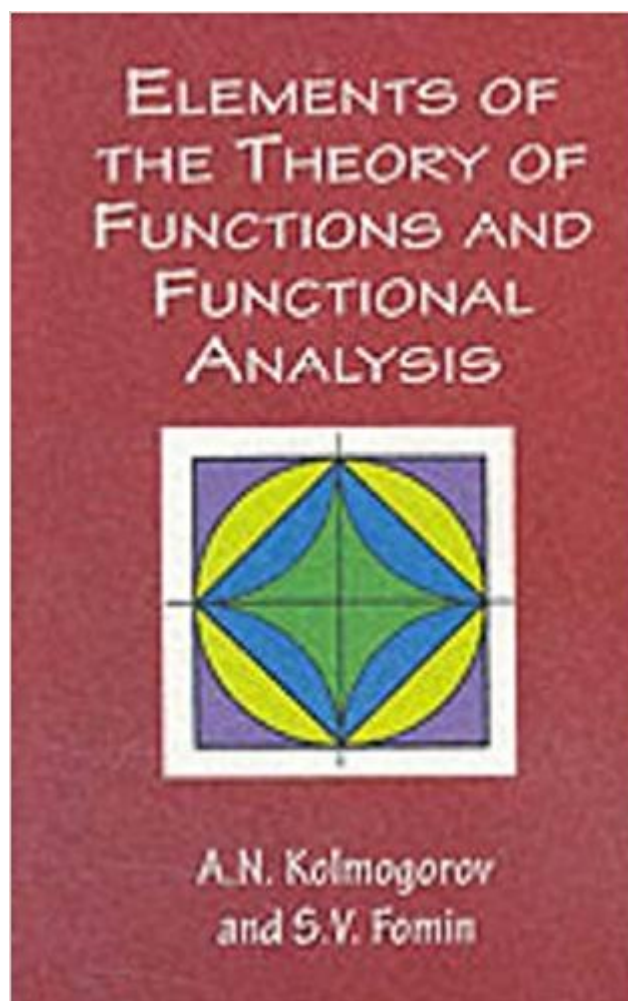


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# Elements Of The Theory Of Functions And Functional Analysis (Dover Books On Mathematics)



## Synopsis

Originally published in two volumes, this advanced-level text is based on courses and lectures given by the authors at Moscow State University and the University of Moscow. Reprinted here in one volume, the first part is devoted to metric and normed spaces. Beginning with a brief introduction to set theory and mappings, the authors offer a clear presentation of the theory of metric and complete metric spaces. The principle of contraction mappings and its applications to the proof of existence theorems in the theory of differential and integral equations receives detailed analysis, as do continuous curves in metric spaces — a topic seldom discussed in textbooks. Part One also includes discussions of other subjects, such as elements of the theory of normed linear spaces, weak sequential convergence of elements and linear functionals, adjoint operators, and linear operator equations. Part Two focuses on an exposition of measure theory, the Lebesgue integral and Hilbert Space. Both parts feature numerous exercises at the end of each section and include helpful lists of symbols, definitions, and theorems.

## Book Information

Series: Dover Books on Mathematics

Paperback: 128 pages

Publisher: Dover Publications; Dover Books on Mathematics edition (February 16, 1999)

Language: English

ISBN-10: 0486406830

ISBN-13: 978-0486406831

Product Dimensions: 5.4 x 0.5 x 8.5 inches

Shipping Weight: 9.6 ounces (View shipping rates and policies)

Average Customer Review: 4.8 out of 5 stars — See all reviews (26 customer reviews)

Best Sellers Rank: #325,044 in Books (See Top 100 in Books) #67 in Books > Science & Math > Mathematics > Pure Mathematics > Functional Analysis #711 in Books > Science & Math > Mathematics > Pure Mathematics > Calculus

## Customer Reviews

This book is divided into two parts. The first part is devoted mainly to metric and normed spaces. There are too a chapter on the essentials of set theory, an addendum on generalized functions, and a chapter on linear operators. The second part is devoted to measure theory, the Lebesgue integral, the theory of square integrable functions ( $L^2$ ) and Hilbert spaces. The second part incorporates exercises to the reader. The clarity of exposition and the elegance of this book is notorious ! This

book can be recommended not only for mathematicians, but for theoretical physicists. Do you know why the Heisenberg picture of quantum mechanics is equivalent to the Schrodinger picture of quantum mechanics ? Mathematically, Heisenberg theory uses the space  $l_2$ , while Schrodinger theory uses the space  $L_2$ . A consequence of the Riesz-Fisher theorem is that the spaces  $l_2$  and  $L_2$  are isomorphic, a result proved in this book. The two theories leads to the same physical results, and in consequence are equivalent, although different in the mathematical content ! You need to buy this book !

This book is actually two books bound as one. The first part concerns metric spaces and normed linear spaces. The second covers Lebesgue integration. The typesetting and prose are sometimes very tight, but some of the constructions used in the proofs are really amazing. Numerous examples are sprinkled through the text. I would not recommend this book as a first book in functional analysis or in Lebesgue integration. To get the most out of this book, you need to have seen many of the results presented elsewhere to really appreciate the Master's technique used in developing those same results in this book.

I must say that Kolmogorov is one of my favorite Russian scientists and scientific writers (the others are Arnol'd, Gel'fand and Landau). His approach over real and functional analysis is superb. But I have a serious complaint: why did Dover choose the old and dated Graylock edition to reprint this masterpiece? The most recent Russian edition has a lot of other important topics (missing in Dover's reprint), such as differential calculus in Banach spaces, which is so difficult to find a decent treatment of. The organization of the book is also better in the Russian edition. A good revised and translated reprint of it would deserve not five, but six, seven, ten stars...

This highly regarded book came out from the notes of Andrei Kolmogorov's lectures given at Moscow's Lomonosov University in the 1940's, and it still stands as one of the best introductions to real analysis available. The authors introduce step by step all the key concepts needed to get a thorough understanding of the subject and proceed all the way long from set theory to Fredholm integral equations. This book is appreciated not only because the topics it includes but mostly because of the insight with which it was written. It is a pleasure to find through every page of the book the great genius of Kolmogorov who not only mastered most areas of mathematics but who also had an almost unparalleled understanding of what the trends of future mathematics would be. The contents are: Elements of Set Theory; Metric and Topological Spaces; Normed and

Topological Linear Spaces; Linear Functionals and Linear Operators; Elements of Differential Calculus in Linear Spaces; Measure, Measurable Functions, Integral; Indefinite Lebesgue Integral, Differentiation Theory; Spaces of Summable Functions; Trigonometric Series, Fourier Transformation; Linear Integral Equations. Full motivation and detailed explanation for each topic. Short bibliography, but that is justified by the fact that the authors themselves were involved in the development of the topics covered. Conclusion: a must-have text for every mathematician or math student.

I own the book in Spanish language. Some content in the book is not easy stuff, if you study by others books, but Kolmogorov has the gift to make easy things that aren't quite so easy. Perhaps some theory is "old", because all the new books use some different approach to the subject, like the chapter dedicated to the Lebesgue integral, the book give the definition of a simple function in a different manner that we use today. The book is a must to have in your library, when you need to work with Functional Analysis.

This book is better than his fabulous Real Analysis book. It is one of the best, if not THE best, functional analysis book out there and the price is low. Quality to price ratio is approaching infinity here (as Dover reduces the price more)!!! Kolmogorov knows how to arrange topics and introduce them at the proper spots throughout the book. Everything is broken down into bite sized pieces and you are given enough examples to digest what's going on. Reading the book is like reading Kolmogorov's mind, as he has tried to teach HOW TO THINK about the material, not just DO IT. It's also very addictive, even though it's rigorous. Name a better functional analysis book? Not sure if that's possible.

This book is not quite up-to-date, but still very good as a starting point in (functional) analysis. The virtue of Kolmogorov and Fomin is their user-friendly writing style. I am delighted to find their book being available for less than ten dollars.

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