

## From Vector Spaces to Function Spaces: Introduction to Functional Analysis with Applications

Yutaka Yamamoto



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## **From Vector Spaces to Function Spaces: Introduction to Functional Analysis with Applications** Yutaka Yamamoto

This book provides a treatment of analytical methods of applied mathematics. It starts with a review of the basics of vector spaces and brings the reader to an advanced discussion of applied mathematics, including the latest applications to systems and control theory. The text is designed to be accessible to those not familiar with the material and useful to working scientists, engineers, and mathematics students. The author provides the motivations of definitions and the ideas underlying proofs but does not sacrifice mathematical rigor.

*From Vector Spaces to Function Spaces* presents an easily accessible discussion of analytical methods of applied mathematics from vector spaces to distributions, Fourier analysis, and Hardy spaces with applications to system theory; an introduction to modern functional analytic methods to better familiarize readers with basic methods and mathematical thinking; and an understandable yet penetrating treatment of such modern methods and topics as function spaces and distributions, Fourier and Laplace analyses, and Hardy spaces.

**Audience:** This book is appropriate for advanced undergraduate or graduate students in science, engineering, or mathematics. It will also be useful to working scientists and engineers who use analytical methods in applied mathematics, systems and control theorists, and practitioners who need basics in mathematics.

**Contents:** Preface; Glossary of Symbols; Chapter 1: Vector Spaces Revisited; Chapter 2: Normed Linear Spaces and Banach Spaces; Chapter 3: Inner Product and Hilbert Spaces; Chapter 4: Dual Spaces; Chapter 5: The Space L(X,Y) of Linear Operators; Chapter 6: Schwartz Distributions; Chapter 7: Fourier Series and Fourier Transform; Chapter 8: Laplace Transform; Chapter 9: Hardy Spaces; Chapter 10: Applications to Systems and Control; Appendix A: Some Background in Sets, Mappings, Topology; Appendix B: Table of Laplace Transform; Solutions; Bibliographical Notes; Bibliography; Index.

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