

Functional Analysis - Web course

COURSE DETAIL

Module No.	Topic/s	Hours
1	Spaces: Linear spaces and linear operators; Normed linear spaces and inner product spaces; Banach spaces ; More about inner product spaces; Bessel's inequality; Fourier expansion, Parseval's formula and Riesz Fischer theorem; Projection theorem.	10
2	Operators: Bounded linear operators; Space of bounded linear operators and Dual space; Riesz representation theorem; Adjoint of an operator; Self adjoint, normal and unitary operators; Dual of some sequence spaces and function spaces; Compact operators.	10
3	Some Important Theorems: Closed graph theorem, open mapping theorem, and uniform boundedness principle; Hahn Banach extension theorem and its consequences.	10
4	Spectral Results: Eigen spectrum and approximate Eigen spectrum; Resolvent set and spectrum; Spectral results for self adjoint, normal and unitary operators; Spectral representation for compact self adjoint operators; Singular value representation of compact operators.	10

References:

NPTEL

<http://nptel.iitm.ac.in>

Mathematics

Pre-requisites:

1. A first course in Linear Algebra.
2. A first course in Real Analysis.
3. A first course in Measure theory and Integration.

Additional Reading:

1. B. Bollobas, *Linear Analysis: An Introductory course*, Cambridge Mathematical Text Books, New York, 1994.
2. C. Goffman and G. Pedrick, *First Course in Functional Analysis*, Prentice Hall of India, New Delhi, 1995.
3. A.E. Taylor and D.C. Lay, *Introduction to Functional Analysis*, 2nd Edition, Wiley, New York, 1980.

Text:

1. **M.T. Nair**, *Functional Analysis: A first Course*, Prentice Hall of India, New Delhi, 2002 (Second Printing: 2008)

References:

2. **B.V.Limaye**, *Functional Analysis*, New Age International Limited, Publishers, New Delhi, 1996.
3. **E. Kreyszig**, *Introductory Functional Analysis with Applications*, John Wiley & Sons, New York, 2001
4. **G.F. Simmons**, *Introduction to Topology and Modern Analysis*, McGraw-Hill Kogakusha, Ltd., New Delhi, 1963

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