

Module Code: MATH-414  
Module Title: **Functional Analysis - II**  
Module Rating: 3 Cr. Hours  
Pre-requisite: Functional Analysis-I

### **Compact Normed Spaces**

- Completion of metric spaces
- Completion of normed spaces
- Compactification
- Nowhere and everywhere dense sets and category
- Generated subspaces and closed subspaces
- Factor Spaces
- Completeness in the factor spaces

### **Complete Orthonormal set**


- Complete orthonormal sets
- Total orthonormal sets
- Parseval's identity
- Bessel's inequality

### **The Specific geometry of Hilbert Spaces**

- Hilbert spaces
- Bases of Hilbert spaces
- Cardinality of Hilbert spaces
- Linear manifolds and subspaces
- Othogonal subspaces of Hilbert spaces
- Polynomial bases in  $L^2$  spaces

### **Recommended Books**

1. G. Bachman and L. Narici, *Functional Analysis*, (Academic Press, New York, 1966)
2. A. E. Taylor, *Functional Analysis*, (John Wiley and Sons, Toppan, 1958)
3. G. Helmberg, *Introduction to Spectral theory in Hilbert spaces*, (North Holland Publishing Company, 1969)
4. E. Kreyszig, *Introduction to Functional Analysis with Applications*, (John Wiley and Sons, 2004)
5. F. Riesz and B. Sz. Nagay, *Functional Analysis*, (Dover Publications, Inc., New York, Ungar, 1965)
6. W. Rudin, *Functional Analysis*, 2<sup>nd</sup> edition, (McGraw Hill Book Company, New York, 1991)

  
CHAIRMAN  
Department of Mathematics  
University of the Punjab  
Lahore-Pakistan