Course Type	Course Code	Name of Course	L	T	P	Credit
DC	**NMCC520**	Functional Analysis	3	1	0	4

Course Objective

- Functional Analysis plays an important role in the applied sciences as well as in mathematics itself. Consequently, it becomes more and more desirable to introduce the student to the field at an early stage of study.

Learning Outcomes

- Functional analysis is an abstract branch of mathematics that originated from classical analysis. The impetus came from applications: problems related to ordinary and partial differential equations, numerical analysis, calculus of variations, approximation theory, integral equations, and so on.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Normed linear spaces and Banach spaces.	8L+2T	To study algebraic operations on linear space and the concept of norm, metric of desired type.
2	Bounded linear operators, Bounded linear functionals, dual spaces.	8L+3T	In this unit the study and classification of linear operators over the same scalar field has been emphasized.
3	Hahn-Banach theorem, Uniform boundedness principle, Open mapping theorem, Closed graph theorem.	8L+3T	To study the existence of non-zero bounded linear functionals on arbitrary non-zero normed space. Some basic theorems for the development of general theory of normed spaces has been discussed.
4	Strong and Weak convergence, Inner product spaces, Hilbert spaces, orthonormal sets, Riesz representation theorem.	9L+3T	To study mutual correspondence between Hilbert space and its dual. To investigate the special theory develop around the idea of mutually orthogonal sets.
5	Adjoint operators, Self adjoint operators, Normal, Unitary operators on Hilbert Spaces.	9L+3T	To design and study the notion of several operators.
Total		**42L+14T**	

Text Books:
1. E-Kreysing, Introductory Functional Analysis with Applications, John Wiley and Sons, 2019.
2. B. V. Limaye, Functional Analysis, 2nd edition, New Age International Publishers, 1996.

Reference Books:
1. G. F. Simmons, Introduction to Topology & Modern Analysis, Robert E. Krieger Publishing Company Malabar, Florida 1983.
2. W Rudin, Functional Analysis Tata McGraw Hill, 1974.