Course Type	Course Code	Name of Course	L	T	P	Credit
DE	**NMCD529**	Methods of Applied Mathematics	3	0	0	3

Prerequisite

- Basics of Real analysis, Differential equations and Matrix theory are required.

Course Objective

- Mathematical methods are used extensively in the different areas of applied sciences. This course aims to provide different methods to solve mathematical problems in applied sciences.

Learning Outcomes

- After completing this course, students can demonstrate competency in employing integral transformations and integral equations. They can quickly obtain solutions to initial and boundary value problems associated with the mathematical modelling of physical phenomena.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	*Laplace transforms*: Definitions, Laplace transforms of some elementary functions, convolution theorem, inverse Laplace transformation, applications to differential equations.	10	Students will understand Laplace transform and its properties. Further, the application of the transform to the problems involving differential equations.
2	*Fourier series*: Definitions, Fourier series of even and odd functions, Extensions to arbitrary intervals, Fourier Integral theorem. *Fourier Transforms*: Definitions, properties, Fourier transforms of some elementary functions, convolution theorems, applications to differential equations.	12	Students will understand Fourier transform and its properties. Further, the application of the transform to the problems involving differential equations.
3	*Integral Equations*: Basic concepts, Volterra integral equations, Relationship between linear differential equations and Volterra integral equations, Resolvent kernel, Method of successive approximations, Convolution type equations, Volterra equation of first kind.	10	This topic helps students to convert initial value problems involving differential equations into integral equations. Further, it enables students to solve it by analytical and approximate techniques.
4	Fredholm integral equations, Fredholm equations of the second kind, the method of Fredholm determinants. Iterated kernels, Integral equations with degenerate kernels, Solution of homogeneous and nonhomogeneous equations.	6	This topic will help to find solutions through characteristic numbers and eigenfunctions. Students can investigate solvability of the integral equations.
5	Construction of Green's functions for boundary value problems, Introduction to singular integral equations.	4	Students understand an important technique of Green's function which is useful for formation of integral equations.
Total		**42**	

Text Books:

1. J. L. Schiff, The Laplace transform: theory and applications, Springer Science and Business Media, 2013.