Semester	Code	Module Title	Credits	C/E/O	GPA/NGPA
3	MA2014	Differential Equations	2	E	GPA

Hours/Week		Pre-requisites/Co-requisites	Evaluation (%)	
Lecture	Tute/Lab		CA	WE
2	0	MA1024	30	70

Learning Outcomes

After the successful completion of this course students should be able to

- Demonstrate the knowledge of Laplace Transform and its applications
- Apply Fourier series to transform functions to trigonometric infinite series
- Classify Partial Differential Equations (PDE) and reduce PDEs to canonical form

Syllabus Outline

Ordinary Linear Differential Equations with Variable Coefficients

- Solutions in series form, Frobenius method.
- Special functions: Introduction of Legendre Polynomials and Bessel's functions.

Laplace Transform and Application to DE

- Laplace transforms of elementary functions and some basic theorems on Laplace transform.
- Inverse Laplace transform, methods to find inverse transform, Convolution theorem.
- Application of Laplace transforms to find solutions to ODEs and systems of ODEs.
- Transfer functions, concepts of stability and controllability.
- Complex Inversion formula.

Fourier Series

- Fourier coefficients, Dirichlet's condition, odd and even functions. Half range series.
- Parseval's Theorem
- Complex Fourier Series
- Fourier series as the norm minimizer

Partial Differential Equations

- Canonical Forms
- Classification of second-order partial differential equations: Hyperbolic, Parabolic and Elliptic
- Linear and Nonlinear First Order Partial Differential Equations. Equations solvable by direct integration
- Solutions by separation of variables.
- Fourier series application to boundary value problems.
- Solve partial differential equations by using Laplace transform.

Fourier Transform and Application to PDE

- Fourier integral theorem
- Fourier transforms, Fourier sine and cosine transform
- Complex form of Fourier Integral
- Properties of Fourier transform.
- Application of Fourier Transform to solve PDEs