IIT Mandi
Proposal for a New Course

Course number : IC-115
Course Name : ODE and Integral transform
Credit Distribution : *2-0-0-2*
Intended for : B.Tech 1st year
Prerequisite : None
Mutual Exclusion : None

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1 **Preamble: Ordinary differential equations (ODEs) arise in many contexts of mathematics and social and natural sciences. Mathematical descriptions of change use differentials and derivatives. Various differentials, derivatives, and functions become related via equations, such that a differential equation is a result that describes dynamically changing phenomena, evolution, and variation. Often, quantities are defined as the rate of change of other quantities (for example, derivatives of displacement with respect to time), gradients of quantities, which is how they enter differential equations.** Differential equations are very important field in terms of applications as well as theory. This course introduces techniques for solving ordinary differential equations.

2 **Course Modules with quantitative lecture hours:**

Unit 1: Ordinary Differential Equations: Origin of differential equations, Formation of differential equations, Order and degree, Equation of first order and first degree, Solution of linear differential equations with constant coefficients, Euler Cauchy Equations, Solution of Second Order differential Equations by change of dependent and independent variables, Method of variation of parameters for second order differential equations, Series solution. [13 Lectures]

Unit 2: Integral transforms: Laplace and Fourier transform, existence, linearity property, shifting property, Inverse Laplace and Fourier, Melin transform, Fourier series [8 Lecture]

3 Text books:

1. G. F. Simmons: Ordinary Differential Equations, Differential equations with applications and historical notes, 2nd Edition.

2. S. L. Ross, Introduction to Ordinary Differential Equations, Wiley, 1980.

4 References:

1. Introduction to Applied Mathematics, Gilbert Strang.

2. E. Kreyszig, Advanced Engineering Mathematics.

5 Similarity with the existing courses: None
(Similarity content is declared as per the number of lecture hours on similar topics)

S. No.		Course Code	Similarity Content	Approx. % of Content
1.				

6. Justification of new course proposal if cumulative similarity content is >30%: