Differential Equations

Code	Credit Hours
MATH-108	3+0

Course Description

In this course first order and higher order differential equations are included so that the students feel comfortable in making mathematical models of physical systems. Laplace Transform and its applications to solve Ordinary Differential equations are included to give them an additional tool to apply in their engineering studies like circuit analysis etc. Fourier series are included to make them capable of tackling periodic signals etc. The course introduces partial differential equations with main focus on solutions of the Wave, heat and Laplace equations using separation of variables.

Text Book:

1. Advanced Engineering Mathematics, 10th edition, Erwin, K. 2011, John Wiley & Sons Inc.
2. A First Course in Differential Equation Zill. Prindle. Weber. Schmidt.1996. Brooks/Cole Publishing.

Reference Book:

1. Differential Equations with Boundary-Value Problems, Dennis. G. Zill, Michael, R. Cullen. 1996, Brooks/Cole Publishing,
2. Elementary Differential Equations with Applications C. H. Edwards. David, E. 1993. Penney, Prentice Hall.

Prerequisites

NIL

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignments	5%
Mid Terms	30%
ESE	50%

Teaching Plan

Week No	Topics	Learning Outcomes
1	Introduction	• Course Outline • Objectives • Teaching plan • Assessment Methods • Concepts Review

2-6	First Order Ordinary Differential Equations	• First Order Ordinary Differential Equations • Basic concept and Modeling • Separable Equations • Exact ODEs • Linear ODEs • Bernoulli Equation • Orthogonal Trajectories
7-8	Second Order Ordinary Differential Equations	• Linear ODEs of Second and Higher Order with constant coefficient using Differential Operators. • Method of Undetermined Coefficients • Cauchy Euler Equations • Method of Variation of Parameters • Applications
9	**MID TERM EXAM**	
10-12	Laplace Transform And Series Solution of ODEs	• Introduction of Laplace Transform • Laplace Transform of elementary functions • First shifting theorem & its application • Laplace Transform of derivatives • Laplace Transform of Integral • nverse Transforms • Solution of differential Equations by Laplace Transform • Unit step function • Second shifting Theorem • Dirac delta function • Initial& final Value Theorem • Laplace Transform of Periodic functions • Convolution • System of differential Equations • Series Solution of ODEs
13-17	Partial Differential Equations	• Partial differential equations solvable as ODEs (separation of variables) • Solution by the Method of Separation of Variables using Fourier Series • Wave equation • Heat Equation; their Solution by Fourier Series. • Laplace Equation in Cartesian coordinates
18	**End Semester Exams**	