



Introduction to Differential Equations

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	231	Introduction to Differential Equations	3	3	0	1	MAT203

Objectives:

- To be familiar with techniques for solving first order.
- To be familiar with techniques for solving second order equations with constant coefficients.
- To study The differential operator of order n and its use in solving general linear homogeneous differential equations with constants coefficients .
- To apply the power series method in searching for a solution of the second order linear differential equations with polynomial coefficients.
- To learn some techniques of simplifying differential equations by reducing equation order or exchanging variables.
- To know how to solve some types nonlinear differential equations.
- To be exposed to matrix calculus and use it in solving linear system of differential equations..

Syllabus:

- **First order differential equations:** separable equations, exact differential equations, homogeneous differential equations, and solution of general first order linear equations.
- **Second order linear differential equations with constants coefficients:** general solution of the homogeneous equation, particular solution of the none-homogeneous equation, the undetermined coefficients and variation of constants methods.
- **Solving linear system of differential equations.**
- **The differential operator of order n and its properties:** General linear homogeneous differential equations with constants coefficients.
- **Power series solutions of second order linear differential equations** with polynomial coefficients. Reducing order of differential equations. Exchanging variables. Bernoulli equations, Riccati equations.

References:

- **A first course in differential equations with applications**, Dennis G. Zill, 5th ed, PWS Kent Publishing Company (2000)
- **Differential Equations**, F. Ayres, Schaum's Outline, McGraw-Hill (1964).
- **Ordinary Differential Equations**, M. Tenenbaum and H. Pallard, Dover Publications (1985).

