



## Differential Equations

Course Code	Course Num.	Course Name	Credit Hours	Lec	Lab	Tut	Prerequisites
MAT	235	Differential Equations	3	2	0	2	MAT 106

### **Syllabus:**

**First order differential equations:** Introduction and First Definitions; Initial Value Problems; Differential Equations as Mathematical Models; Separable equations, first order linear equations, exact differential equations, homogeneous differential equations, Bernoulli equations.

**Second order linear differential equations with constants coefficients:** general solution of the homogeneous equation, reduction of the order method, particular solution of the nonhomogeneous equation, the undetermined coefficients and variation of constants methods; Variation of Parameters Method; Euler-Cauchy equation, Some applications: Damped free and forced vibrations; Mechanical vibrations....

**Laplace Transform:** Basic definitions; Properties of Laplace Transform; Inverse Laplace Transform; Solving initial values problems using Laplace Transform.

**Series solutions of Differential Equations:** Review of Power Series; Power series solution to linear differential equations.

**Systems of First Order Linear Differential Equations:** Linear System in Normal Form.: homogeneous systems of linear differential equations with constant coefficients.

### **References:**

1. *Fundamentals of Differential Equations*, R. Nagle, E. Saff and A. Snider; Addison-Wisley, 6<sup>th</sup> ed. (2011). **(Main Reference)**
2. *Advanced Engineering Mathematics*, E. Kreyszig; John Wiley & Sons, INC 10<sup>th</sup> ed. (2010).
3. *A first course in differential equations with applications*, Dennis G. Zill, 5<sup>th</sup> ed, PWS Kent Publishing Company (2000).
4. *Elementary Differential Equations and Boundary Value Problems*, W. Boyce and R. DiPrima 9<sup>th</sup> edition, New York: John Wiley & Sons, 2010

