MATH 204

Differential Equations

Instructor: **Ibraheem Alolyan**

Office: 2A181, Tel; 0114676523
Email: ialolyan@ksu.edu.sa
Office Hours: Mon: 7 – 8, 12:30 – 2 ,,,, Wed 7 - 9, 10-11, 12 – 1
(If these times are not convenient, please feel free to contact me by email, and we can arrange an alternative meeting time.

Text Books:

1- Differential Equations by Said Mesloub, Mostafa Damlakhi and Khawaja Zafar Elahi.
2- Differential equations with boundary value problems: by Dennis G. Zill and Michael R Cullen (Seventh or sixth edition)

Weekly Course Topics:

1- Definition of a Differential equation, Classification of Differential equations, type of solutions.
2- Initial value problems. Existence and uniqueness theorem, separable equations (Separable variables).
3- Equations with homogeneous coefficients, Exact Equations
4- Integrating factors, general form of a linear equation and Equations with linear coefficients
5- Bernoulli equation.
6- Applications, Linear Models: Orthogonal trajectories, Growth and decay, Newton's Law of Cooling.
7- Higher order Differential equations. Linear Differential equations: Existence-Uniqueness Theorem, Linearly (independent solutions, dependent solutions), Wronskian, Method of Reduction of order.
8- Homogeneous linear Differential equations with constant coefficients. Undetermined coefficient method.
9- Cauchy-Euler Equation, Variation of parameters.
10- Solving systems of Linear Equations by Elimination Method.
11- Series solutions of Linear Equations.
12- Orthogonal Functions and Fourier series.
13- Fourier cosine and sine series, Complex Fourier series.
14- Fourier Integral. Complex form of Fourier integral

Grading:

First midterm **25** (Wed 8 / 10 / 2025) (7:30 – 9:00 pm)
Second midterm **25** (Wed 12 / 11 / 2025) (7:30 – 9:00 pm)
Quizzes **10**
Final **40** (Thu 25 / 12 / 2025) (1:00 – 4:00 pm)