LINER ALGEBRA&DIFFRENTIAL EQUATION
MATH 227 : 4 Credit hours (3 lectures, 0 lab, 2 exercises)

Prerequisites:
MATH 113

Objectives:
- To introduce students to the subject of linear algebra which is essential for subsequent courses in mathematics and computer science.
- To let students be familiar with basics of matrix theory and vector spaces.
- To be familiar with techniques for solving first order differential equations, second order differential equations with constant coefficients and system of linear differential equations.
- To study elementary numerical methods for finding approximated solutions of first order linear differential equations.

Course Description:
This course teaches Liner algebra & differential equation

Contents:
- Matrices: elementary row operations, transpose of a matrix, inverse of a square matrix, determinants and their properties, classical adjoint; linear equation systems and Gauss eliminations, Cramer's rule.
- Vector spaces: Basic definitions, subspaces, linear dependence and independence, bases and dimensions.
- Diagonalisation: Eigenvalues and eigenvectors, diagonalisation.
- First order differential equations: separable equations, homogeneous differential equations, and solution of general first order linear equations.
- Numerical methods: Euler and Runge-Kutta methods finding approximated solutions of first order linear differential equations.
- Second order linear differential equations: general solution of the homogeneous equation second order linear differential equations with constants coefficients, particular solution of the none-homogeneous equation, the undetermined coefficients and variation of constants methods.

The instructor should stress on using mathematical software through out the course.

References:
- *LINEAR ALGEBRA,* M.Lipson, Schaum's Outline, S. Lipschutz, McGraw-Hill 3rd edition. (2000).
- *LINEAR ALGEBRA,* S. Leduc, Cliffs Notes (1996).
- *A FIRST COURSE IN DIFFERENTIAL EQUATIONS WITH APPLICATIONS,* Dennis G. Zill, 5th edition., PWS – Kent Publishing Company (2000).