

Linear Algebra & ODEs

Code	Credit Hours
MATH-121	3+0

Course Description

The successful completion of the course should develop the ability to select an appropriate and efficient method for solving linear system of equations. The handling with the Eigenvalue problems which are extensively studied for example in resonance and vibration theory. The understanding of Ordinary Differential Equations which is a strong tool for Mathematical Modeling. The Understanding of Laplace transforms with applications in various engineering/technological concepts.

Text Book:

- Advanced Engineering Mathematics, (10th Edition) by Erwin Kreyszig, John Wiley and Sons, inc 2006
- Differential Equations with boundary value problems (7th Edition) by Dennis G. Zill and Michael Cullen

Reference Book:

- "Introductory Linear Algebra (7th Edition) by B. Kolman, David R Hill Pearson Education (Singapore) 2003.
- Linear Algebra with Applications (6th Edition) by Gareth Williams, Jones and Bartlett 2008
- Modern Engineering Mathematics by Glyn Jame

Prerequisites

Nil

ASSESSMENT SYSTEM

Quizzes	10%
Assignment	10%
Mid Terms	30%
ESE	50%

Teaching Plan

Sr. No	Main Topics to be covered	Estimated Contact Hours
1	Linear Algebra Basic Concepts. Matrix Addition. Scalar Multiplication, Matrix Multiplication	1
2	Linear Systems of Equations. Gauss Elimination.	1
3	Solution of Linear Systems: Existence, Uniqueness, General Form	1
4	Inverse of a Matrix. Gauss-Jordan Elimination.	3
5	Vector Spaces, Sub Spaces and Linear Transformations	3
6	Linear dependence, linear independence, spanning set, basis	4
7	Eigenvalues and Eigenvectors	3
8	Mid Semester Examination	
8	First Order Ordinary Differential Equations Separable Variables.	2
9	Homogeneous Equations.	2
10	Exact Equations and Integrating Factors.	3
11	Linear Equations.	1
12	Equations of Bernoulli, Ricatti and Clairaut.	2
13	Applications of Linear and Non-Linear First Order ODEs.	2
14	Linear Differential Equations of Higher Order Preliminary Theory. Initial and Boundary Value Problems. Linear Dependence and Linear Independence.	1
15	Homogeneous Linear Equations with constant coefficients.	3
16	Non-Homogeneous Linear Equations with constant coefficients	1
17	Undetermined Coefficients.	2
18	Variation of Parameters.	2
19	Non-Homogeneous Linear Equations with Variable Coefficients Cauchy-Euler Equation.	2
20	Laplace Transform Laplace Transform and Inverse Transform.	3
21	Unit step function, Dirac delta function	2
22	Solution of 1 st and higher order initial value problem using Laplace Transform.	4
23	End Semester Examination	