

ME 616 - Matrix Methods in Mechanical Engineering (3 credits)

Prerequisite: undergraduate differential equations.

Development of matrix equations through numerical analysis of differential equations and comparison of solutions with exact and series solutions. Matrix methods in engineering problems are presented and MATLAB project is required. Matrix theory is used to show the basic unity in engineering analysis.

Use of software package such as Matlab is encouraged but the homework and exams should be done by hand. Students should have the ability to carry out basic hand computations without computer assistance, Students will learn to obtain solutions to ODE and PDE through matrix methods.

Textbook: Advanced Engineering Mathematics
By Dennis G. Zill, Warren S. Wright 5th ed. 2014
Published by Jones & Bartlett ISBN 9781-4496-9172-1

References:

1. Matlab: An Introduction with Applications: Amos Gilat. John Wiley & Sons, 2005 2nd ed. ISBN 0-471-69420-7
2. Matlab for Engineers: Holly Moore, Pearson Printice Hall, 2007 ISBN 0-13-187244-3
- 3.. An Introduction to The Finite Element Method. J N ReddyMcGraw-Hil. 1st ed. Or 2nd ed.
- 4.. Introduction to Finite Element Analysis and Design. Nam-Ho Kim & Bhavani V Sankar John Wiley & Sons, 2009, ISBN 978-0-470-12539-7

Course Calender

Topics	Chapter
1..Introduction to Matlab, ODE Solution	1
2.3, ODE and quiz 1.	3
4., Matrix equation and basic operation	8
5., Matlab scrip file and functions, Euler method.	6
6., Runge-Kutter method and vibration problems	6
7., Boundary Value Problems and fin problems	6
8. PDE numerical, explicit and implicit methods	16

9. Quiz 2. Matlab programming, Project	ref, handout
10., Elimination methods, Vector	16,7
11., Matrix method	8
12., Separation of Variables	13
13., Fourier Series and Laplace Transform	13, handout
14., Weighted Residual Method and FEM	ref. handout
15., Review and Final Exam.	

Quiz 1, 23%, Quiz 2, 23%, Final exam 46%, Proj+HW+class performance =8%

The NJIT Honor Code will be upheld and violations will be brought to the immediate attention of the Dean of Students.