AIT 324 DATA ANALYSIS WITH MATLAB/OPEN SOURCE PLATFORMS 3 (2+1)

UNIT I

Introduction

The basic features of Data Analysis Platform(s), A Few Elementary Calculations, File types , General commands; Matrices and Vectors: Input, Indexing, Matrix manipulation, Creating vectors; Matrix and Array Operations: Arithmetic operations, Relational operations, Logical operations, Elementary math functions, Matrix Functions; Character Strings: Manipulating character strings, eval Function; Command- Line Functions: Inline functions, Built-in Functions, Plotting Simple Graphs

UNIT II

Programming Techniques

Data Types, Global variables, Loops, control-flow, Interactive input, Advanced Data Objects, Multidimensional matrices, Structures, Functions, Classes and Objects, Files I/O

UNIT III

Applications

Linear Algebra, Interpolation, Ordinary Differential Equations, Numerical Integration, Graphics: Basic 2-D Plots, Using subplot for Multiple Graphs, 3-D Plots, Saving and Printing Graphs, Statistical plotting and data visualization

UNIT IV

Modelling and Curve Fitting

Introduction to Curve Fitting, Building a Simple Model; Curve Fitting Tools, Programmatic Curve Fitting, Data Modelling, Linear and Nonlinear Models

UNIT V

Statistical Tools

Data organization and management, Database Connectivity, Descriptive Statistics, Probability Distributions, Hypothesis Tests, Correlation and Regression, Design of Experiments

Practical(s)

1. An overview of various software(s)
2. Create and work with arrays of numbers
3. Create and print simple plots
4. Manipulate matrices and use them as matrices or arrays
5. Use Built- in Functions
6. Work with symbolic and various numerical libraries
7. Saving, loading, importing, and exporting data
8. Finding the determinant of a matrix , eigenvalues and eigenvectors
9. Curve Fitting and Interpolation
10. Data Analysis and Statistics
11. Ordinary Differential Equations
12. Hypothesis Testing
13. Correlation and Regression

14. Design of Experiments

Reference Book(s)

1. Wes McKinney (3E) Python for Data Analysis, O'Reilly
2. Chapra S.C. and Canale R.P. (2006) Numerical Methods for Engineers, 5th Ed., McGraw Hill
3. Hanselman, Duane. Little_eld, Bruce. Mastering Matlab (international edition). Pearson/Prentice Hall.
4. Hadley Wickham and Garrett Grolemund, R for Data Science, O'Reilly