ALTALUNE TECHNOLOGY

MATLAB

OVERVIEW

MATLAB's Power of Computational Mathematics

Features of MATLAB
Uses of MATLAB

1. **ENVIRONMENT**

Local Environment Setup
Understanding the MATLAB Environment

2. **BASIC SYNTAX**

Hands on Practice
Use of Semicolon (;)in MATLAB
Adding Comments
Commonly used Operators and Special Characters
Special Variables and Constants
Naming Variables
Saving Your Work
VARIABLES
Multiple Assignments
I have forgotten the Variables!
Long Assignments
The format Command
Creating Vectors
Creating Matrices

3. **COMMANDS**

Commands for Managing a Session
Commands for Working with the System
Input and Output Commands
Vector, Matrix, and Array Commands
Plotting Commands

4. **M-FILES**

The M Files

Creating and Running Script File

5. **DATATYPES**

Data Types Available in MATLAB
Data Type Conversion
Determination of Data Types

6. **OPERATORS**
Arithmetic Operators
Functions for Arithmetic Operations
Relational Operators
Logical Operators
Functions for Logical Operations
Bitwise Operations
Set Operations

7. **DECISION MAKING**
if...end Statement
if...else...end Statement
if...elseif...elseif...else...end Statements
The Nestedif Statements
The switch Statement
The Nested Switch Statements

8. **LOOPTYPES**
The while Loop
The for Loop
The Nested Loops

Loop Control Statements
The break Statement
The continue Statement

9. **VECTORS**

Row Vectors
Column Vectors

Referencing the Elements of a Vector
Vector Operations
Addition and Subtraction of Vectors
Scalar Multiplication of VectorsTranspose of a
Vector Appending Vectors
Magnitude of a Vector
Vector Dot Product
Vectors with Uniformly Spaced Elements

10. **MATRIX**

Referencing the Elements of a Matrix
Deleting a Row or a Column in a Matrix
Matrix Operations
Addition and Subtraction of Matrices
Division (Left, Right) of Matrix
Scalar Operations of Matrices
Transpose of a Matrix
Concatenating Matrices
Matrix Multiplication
Determinant of a Matrix
Inverse of a Matrix

11. **ARRAYS**

Special Arrays in MATLAB
A Magic Square
Multidimensional Arrays
Array Functions
Sorting Arrays
Cell Array
Accessing Data in Cell Arrays

12. **COLONNOTATION**

13. **NUMBERS**

Conversion to Various Numeric Data Types

Smallest and Largest Integers
Smallest and Largest Floating Point Numbers

14. **STRINGS**

Rectangular Character Array
Combining Strings into a Cell Array
String Functions in MATLAB

15. **FUNCTIONS**
Anonymous Functions
Nested Functions
Private Functions
Global Variables

16. **DATA IMPORT**
Low-Level File I/O
Import Text Data Files with Low-Level I/O

17. **DATA OUTPUT**
Writing to Diary Files
Exporting Data to Text Data Files with Low-Level I/O

18. **PLOTTING**
Adding Title, Labels, Grid Lines, and Scaling on the Graph
Drawing Multiple Functions on the Same Graph
Setting Colors on GraphSetting Axis Scales
Generating Sub-Plots

19. **GRAPHICS**

Drawing Bar Charts
Drawing Contours
Three-Dimensional Plots

20. **ALGEBRA**

Solving Basic Algebraic Equations in MATLAB
Solving Quadratic Equations in MATLAB
Expanding and Collecting Equations in MATLAB
Expanding and Collecting Equations in Octave

Factorization and Simplification of Algebraic Expressions

21. **CALCULUS**
Calculating Limits
Verification of Basic Properties of Limits
Left and Right Sided Limits

22. **DIFFERENTIAL**
Verification of Elementary Rules of Differentiation
Derivatives of Exponential, Logarithmic, and Trigonometric Functions
Computing Higher Order Derivatives
Finding the Maxima and Minima of a Curve
Solving Differential Equations

23. **INTEGRATION**

Finding Indefinite Integral Using MATLAB
Finding Definite Integral Using MATLAB

24. **POLYNOMIALS**
Evaluating Polynomials
Polynomial Curve Fitting

25. **STATISTICS**
Mean
Median
Mode
Variance
Standard Deviation

26. **APPLICATION OF MATLAB**
Introduction to Image Processing
Basics of Image and Computation in MATLAB
Types of Images
Processing of grey scale images
Processing of coloured images
Projects based on digital signal processing, image processing & wireless communication.