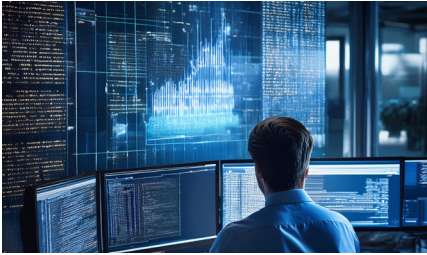




iMSD

MATLAB Course Core Components





MATLAB Course Outline

Introduction to MATLAB

- Introduction to the course
- Setting up MATLAB environment
- Overview of MATLAB interface (Command Window, Workspace, Editor, etc.)

MATLAB basics

- Syntax and structure of MATLAB scripts
- Variables and data types
- Basic operations (arithmetic, relational, logical)
- Input and output (input, disp, fprintf)
- Comments and documentation

Working with Matrices and Arrays

- Matrix Operations
- Creating and manipulating matrices
- Matrix arithmetic
- Element-wise operations
- Matrix functions (size, length, transpose, etc.)

Array Operations

- Creating and manipulating arrays
- Indexing and slicing arrays
- Array functions (sum, mean, std, etc.)

Programming Constructs

- Conditional Statements
- `if`, `else`, and `elseif` statements
- Switch-case statements

MATLAB loops

- `for` loop
- `while` loop
- Loop control statements (`break`, `continue`)

MATLAB Functions

- Defining Functions
- Function declaration and definition
- Function inputs and outputs
- Local and global variables

Advanced Function Topics

- Anonymous functions
- Function handles
- Nested functions
- Variable number of input/output arguments (`varargin`, `varargout`)

Duration: 3 Days

Related Courses:

Python, C++, MATLAB, Java, C#,
Lisp, Pascal, Scratch,

Course Overview and Objectives

This MATLAB course is designed to introduce students to the powerful programming and numeric computing environment of MATLAB.

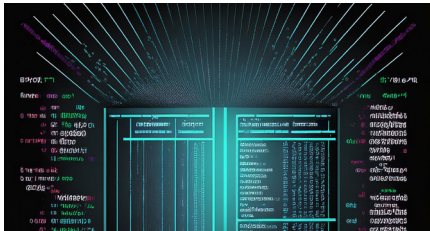
It covers the fundamental concepts of MATLAB programming and its applications in data analysis, visualization, modeling, and engineering problem-solving. Whether you are a beginner or an experienced user, this course will help you harness MATLAB's capabilities for a wide range of tasks, from basic scripting to advanced computational techniques.

Pre-requisites:

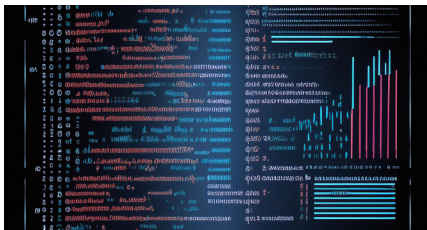
Basic knowledge of mathematics (calculus and linear algebra) and programming (e.g., Python or C++) is recommended but not required.

Course Format:

Lectures, hands-on labs, assignments, and a final project.

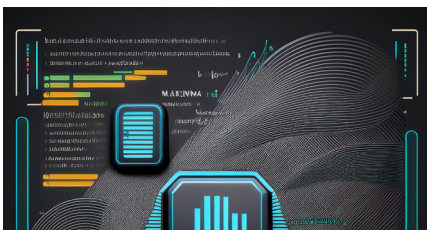


Navigate the MATLAB environment confidently: Understand the MATLAB interface, command window, and workspace to perform basic operations.



Programming

Develop and execute MATLAB scripts: Write and debug MATLAB scripts to automate tasks and solve problems efficiently.



Design

Manipulate and analyze data using MATLAB: Import, export, and process data using MATLAB's powerful data handling tools.

Data Visualization

- Plotting Basics
- 2D plots (plot, scatter, bar, etc.)
- Customizing plots (labels, titles, legends, etc.)
- Subplots

Advanced Plotting

- 3D plots (plot3, mesh, surf, etc.)
- Specialized plots (histograms, pie charts, etc.)
- Animation and dynamic plots

Data Import and Export

- File I/O
- Reading from and writing to files (text, CSV, Excel)
- Importing data from external sources
- Exporting data to various formats

Advanced Data Handling

- Advanced Data Types
- Cell arrays
- Structures
- Tables

Data Preprocessing

- Data cleaning
- Data transformation
- Handling missing data

MATLAB Programming

- Script and Function Files
- Creating and running scripts
- Creating and using function files

Debugging and Optimization

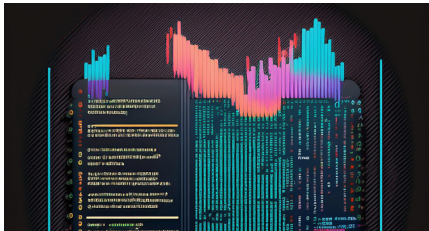
- Debugging techniques
- Code profiling and optimization
- Best practices for efficient coding

MATLAB Applications

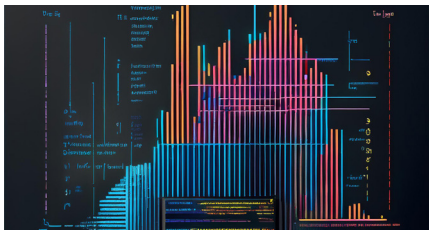
- Signal Processing
- Basic signal processing techniques
- Fourier analysis
- Filtering

Image Processing

- Basic image processing techniques
- Image enhancement
- Image segmentation



Create and customize data visualizations: Generate a wide variety of 2D and 3D plots and customize them for presentations and reports.



Apply MATLAB

to solve mathematical problems: Use MATLAB's built-in functions for matrix operations, statistics, and numerical analysis.



Develop a comprehensive MATLAB project: Integrate knowledge from the course to create a final project that demonstrates proficiency in MATLAB.

Control Systems

- Modeling.
- Simulation of control systems.
- Control design.
- Analysis.
- Simulink introduction

Toolboxes and Advanced Features

- Introduction to Toolboxes
- Overview of commonly used toolboxes.
- Signal Processing.
- Image Processing.
- Control System.
- Installing and using toolboxes

MATLAB Simulink

- Introduction to Simulink
- Creating and simulating models
- Interfacing Simulink with MATLAB

Project Development

- Project Planning
- Choosing a project
- Project requirements and scope

Project Implementation

- Writing code
- Testing and debugging

Project Presentation

- Documenting the project
- Presenting the project

Conclusion

- Course Review
- Summary of topics covered
- Best practices in MATLAB programming
- Further learning resources

We offer online support to clients on content covered on our courses.