

CERTIFIED IN MATLAB PROGRAMMING

DURATION - 30 DAYS

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Introduction

- Obtain a quick overview of The Math Works and MATLAB
- Discuss course set-up
- Evolution of the language
- Features of Mat lab

Working with the MATLAB User Interface

- Command window
- Command History
- Workspace
- Reading and writing data

Variables and Expressions

- Entering commands
- Creating variables
- Getting help
- Accessing and modifying values in variables

Operators

- Operators classification
- Arithmetic operators
- Relational operators
- Logical operators
- Assignment operator
- Semicolon operator
- Colon operator
- Typecasting operator

Flow Control

- Simple if
- If - else
- Else if
- Nested if
- Switch
- For loop
- While loop

Writing Functions

- Creating functions
- Calling functions

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- Sub functions

Data Types

- MATLAB® data types
- Integers
- Structures
- Function handles

Analysis and Visualization with Vectors

- Calculations with vectors
- Plotting vectors
- Basic plot options
- Annotating plots

Analysis and Visualization with Matrices

- Size and dimensionality
- Calculations with matrices
- Multidimensional arrays

Graphics

- 2Dimensional plots
- 3Dimensional plots
- Contour plots

File I/O

- Opening and closing files
- Reading and writing text files
- Reading and writing binary files

Graphical User Interfaces

- GUIDE introduction
- Designing the GUI
- Programming the GUI

Matlab Image Processing Training

We provide hands-on experience with performing image analysis. Examples and exercises demonstrate the use of appropriate MATLAB® and Image Processing Toolbox™ functionality throughout the analysis process. Topics include:

- Importing and exporting images

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- Analyzing images interactively
- Removing noise
- Aligning images and creating a panoramic scene
- Detecting lines and circles in an image
- Segmenting object edges
- Segmenting objects based on their color and texture
- Performing batch analysis over sets of images
- Segmenting objects based on their shape using morphological operations
- Measuring shape properties

Course Objective:

Importing and Visualizing Images

Objective: Import image or video frames into MATLAB and visualize them. Convert images to a format that is useful for analysis.

- Importing and displaying images
- Converting between image types
- Exporting images
- Importing and playing video files

Interactive Exploration of Images

Objective: Explore object details such as shape, texture, and color and create a custom image exploration tool.

- Obtaining pixel intensity values
- Extracting a region of interest
- Computing pixel statistics on a region of interest
- Measuring object sizes
- Creating a custom interactive tool

Preprocessing Images

Objective: Perform image preprocessing operations and apply custom functions to images.

- Adjusting image contrast
- Reducing noise in an image
- Using sliding neighborhood operations
- Using block processing operations

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Spatial Transformation and Image Registration

Objective: Align images to use the same scale and orientation. Compare aligned images. Create a panoramic scene by stitching images.

- Geometric transformations
- Image registration using point mapping
- Creating a panoramic scene

Matlab Signal Processing Training

We shows how to analyze signals and design signal processing systems using MATLAB, Signal Processing Toolbox™, and DSP System Toolbox.

Topics include:

Creating and analyzing signals

- Performing spectral analysis
- Designing and analyzing filters
- Designing multi-rate filters
- Designing adaptive filters

Course Objective:

Signals in MATLAB

Objective: Generate sampled and synthesized signals from the command line and visualize them. Create noise signals for a given specification. Perform signal processing operations like re-sampling, modulation, and correlation.

Creating discrete signals

Sampling and re-sampling

- Visualizing signals
- Modeling noise
- Performing re-sampling, modulation, and correlation
- Generating streaming signals

Spectral Analysis

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Objective: Understand different spectral analysis techniques and the use of windowing and zero padding. Become familiar with the spectral analysis tools in MATLAB and explore nonparametric (direct) and parametric (model-based) techniques of spectral analysis.

Discrete Fourier transform

- Windowing and zero padding
- Power spectral density estimation
- Time-varying spectra
- Using a spectrum analyzer in MATLAB

Linear Time Invariant Systems

Objective: Represent linear time-invariant (LTI) systems in MATLAB and compute and visualize different characterizations of LTI systems.

LTI system representations

- z-transform
- Frequency and impulse response
- Visualizing filter properties
- Applying filters to finite and streaming signals

Matlab Simulink Training

Simulink for System and algorithm Modeling

we provide training in algorithm modeling and design validation in Simulink. It demonstrates how to apply basic modeling techniques and tools to develop Simulink block diagrams.

Topics include:

Creating and modifying Simulink models and simulating system dynamics
Modeling continuous time, discrete time, and hybrid systems
Modifying solver settings for simulation accuracy and speed

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Building hierarchy into a Simulink model

Creating reusable model components using subsystems, libraries, and model references

Creating and Simulating a Model Objective:

Create a simple Simulink model, simulate it, and analyze the results.

Define the potentiometer system

Explore the Simulink environment interface

Create a Simulink model of the potentiometer system

Simulate the model and analyze results Modeling

Programming Constructs Objective:

Model and simulate basic programming constructs in Simulink.

Comparisons and decision statements

Zero crossings

MATLAB Function block

Modeling Discrete Systems

Objective:

Model and simulate discrete systems in Simulink.

Define discrete states

Create a model of a PI controller

Model discrete transfer functions and state space systems

Model multirate discrete systems

Modeling Continuous Systems

Objective:

Model and simulate continuous systems in Simulink.

Create a model of a throttle system

Define continuous states

Run simulations and analyze results

Model impact dynamics

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Solver Selection Objective:

Select a solver that is appropriate for a given Simulink model.

- Solver behavior
- System dynamics
- Discontinuities
- Algebraic loops

Developing Model Hierarchy Objective:

Use subsystems to combine smaller systems into larger systems.

- Subsystems
- Bus signals
- Masks

Modeling Conditionally Executed Algorithms Objective:

Create subsystems that are executed based on a control signal input.

- Enabled subsystems
- Triggered subsystems
- Input validation model

Combining Models into Diagrams Objective:

Use model referencing to combine models.

- Model referencing and subsystems
- Model referencing workflow
- Setup a model reference
- Model reference simulation modes
- Store parameters in referenced models

Creating Libraries Objective:

Use libraries to create and distribute custom blocks.

- Create and populate libraries
- Manage library links
- Add a library to the Simulink Library Browser