



# Aerospace AI Curriculum



SciEngineer's training courses are designed to help organizations and individuals close skills gaps, keep up-to-date with the industry-accepted best practices and achieve the greatest value from MathWorks® and COMSOL® Products.



# MATLAB Fundamentals for Aerospace Applications

This three-day course provides a comprehensive introduction to the MATLAB technical computing environment. Themes of data analysis, visualization, modeling, and programming are explored throughout the course. The course offers hands-on aerospace examples and exercises that apply basic techniques to realistic problems in a variety of aerospace and defense applications.

## Prerequisites

Undergraduate-level mathematics and experience with basic computer operations

[Detailed course outline >>](#)

A dark blue rounded rectangle containing course details. On the left, under 'DURATION', it says '3 Days' with three orange circles below. On the right, under 'LEVEL', it says 'Basic' with a progress bar consisting of one orange segment followed by two black segments.

DURATION	LEVEL
3 Days	Basic

## TOPICS

### Day 1

- Working with the MATLAB User Interface
- Variables and Commands
- Analysis and Visualization with Vectors

### Day 2

- Analysis and Visualization with Matrices
- Tables of Data
- Conditional Data Selection
- Organizing Data

### Day 3

- Analyzing Data
- Increasing Automation with Programming Constructs
- Increasing Automation with Functions

# MATLAB for Data Processing and Visualization

This one-day course focuses on importing and preparing data for data analytics applications. Topics discussed include importing data from multiple sources, processing data, producing informative customized graphics and working with irregular data.

## Prerequisites

MATLAB Fundamentals

[Detailed course outline >>](#)

DURATION	LEVEL
1 day	Medium
	

### TOPICS

## Day 1

- Importing Data
- Processing Data
- Customizing Visualizations
- Working with Irregular Data

# MATLAB Programming Techniques

This two-day course provides hands-on experience using the features in the MATLAB language to write efficient, robust, and well-organized code. These concepts form the foundation for writing full applications, developing algorithms, and extending built-in MATLAB capabilities. Details of performance optimization, as well as tools for writing, debugging, and profiling code are covered.

## Prerequisites

MATLAB Fundamentals or equivalent experience using MATLAB

[Detailed course outline >>](#)

DURATION	LEVEL
2 Days	Medium
	

### TOPICS

## Day 1

- Structuring Data
- Managing Data Efficiently
- Utilizing Development Tools

## Day 2

- Creating Robust Applications
- Structuring Code
- Verifying Application Behavior

# Building Interactive Applications in MATLAB

This one-day course demonstrates how to create an interactive user interface for your applications in the App Designer environment. You will learn about user interface controls, responsive components, extra dialog windows and how to use them to create a robust and user-friendly interface for your MATLAB app. No prior experience of programming graphical interfaces is required.

## Prerequisites

MATLAB Fundamentals

[Detailed course outline >>](#)

DURATION	LEVEL
1 Day	Medium
	

### TOPICS

## Day 1

- Using the App Designer Environment
- Creating and Updating Plots
- Creating Responsive Components
- Managing Multiple Windows and Apps

# Signal Preprocessing and Feature Extraction for Data Analytics with MATLAB

This one-day course shows how to preprocess time-based signals and extract key features in the time and frequency domains. This course focuses on creating, importing, visualizing signals, preprocessing to improve data quality and extracting features in the time and frequency domains. No prior knowledge on signal processing is needed for this course.

## Prerequisites

MATLAB Fundamentals or equivalent experience using MATLAB

[Detailed course outline >>](#)

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DURATION	LEVEL
1 day	Medium

### TOPICS

## Day 1

- Explore and Analyze Signals (Time Series) in MATLAB
- Preprocess Signals to Improve Data Set Quality
- Extract Features from Signals

# Machine Learning with MATLAB

This two-day course focuses on data analytics and machine learning techniques in MATLAB using functionality within Statistics and Machine Learning Toolbox and Deep Learning Toolbox. The course demonstrates the use of unsupervised learning to discover features in large data sets and supervised learning to build classification, predictive and regressive models and neural networks.

## Prerequisites

MATLAB Fundamentals

[Detailed course outline >>](#)

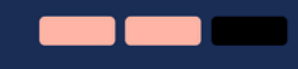
DURATION

2 Days



LEVEL

Medium



### TOPICS

## Day 1

- Importing and Organizing Data
- Finding Natural Patterns in Data
- Building Classification Models

## Day 2

- Improving Predictive Models
- Building Regression Models
- Creating Neural Networks



# Accelerating and Parallelizing MATLAB Code

This two-day course covers a variety of techniques for making your MATLAB code run faster. You will identify and remove computational bottlenecks using techniques like pre-allocation and vectorization. In addition, you will compile MATLAB code into MEX-files using MATLAB Coder. On top of that, you will take advantage of multiple cores on your computer by parallelizing for-loops with Parallel Computing Toolbox and scale up across multiple computers using MATLAB Parallel Server.

## Prerequisites

MATLAB Fundamentals, or equivalent experience using MATLAB

[Detailed course outline >>](#)

DURATION	LEVEL
2 Days	Medium
	

### TOPICS

#### Day 1

- Improving Performance
- Generating MEX-Files
- Parallelizing Computations

#### Day 2

- Parallel for-Loops
- Offloading Execution
- Working with Clusters
- GPU Computing

# Processing Big Data with MATLAB

This one-day course focuses on adapting existing algorithms to work with a dataset that is too big to fit in memory. You will learn represent big data in MATLAB, adjust existing code to work efficiently with it, and scale up the analysis to take advantage of your own computing resources or a cloud.

## Prerequisites

MATLAB for Data Processing and Visualization, or equivalent experience using MATLAB

[Detailed course outline >>](#)

DURATION	LEVEL
1 day	Medium
	

### TOPICS

## Day 1

- Prototyping Big Data Algorithms
- Handling Custom Data and Algorithms
- Working with Clusters and Clouds

# Image Processing with MATLAB

This two-day course provides a comprehensive introduction of reference-standard algorithms and workflow for image processing, analysis, visualization and algorithm development. Examples and exercises demonstrate the use of appropriate MATLAB and Image Processing Toolbox functionality throughout the analysis process.

## Prerequisites

- MATLAB Fundamentals or equivalent experience using MATLAB.
- Basic knowledge of image processing concepts is strongly recommended.

[Detailed course outline >>](#)

DURATION	LEVEL
2 Days	Medium
	

### TOPICS

#### Day 1

- Importing and Visualizing Images
- Preprocessing Images
- Color and Texture Segmentation
- Improving Segmentation

#### Day 2

- Finding and Analyzing Objects
- Detecting Edges and Shapes
- Spatial Transformation and Image Registration
- Automating Image Registration with Image Features

# Deep Learning with MATLAB

This two-day course provides a comprehensive introduction to create, train, and evaluate different kinds of deep neural networks. This course focuses on convolutional neural networks and long short-term memory networks to perform classification, regression, forecasting, solving custom problems and improving the performance.

## Prerequisites

MATLAB Fundamentals and Deep Learning with Onramp

[Detailed course outline >>](#)

DURATION	LEVEL
2 Days	Medium
	

### TOPICS

## Day 1

- Transfer Learning for Image Classification
- Interpreting Network Behavior
- Creating Networks
- Training a Network

## Day 2

- Improving Network Performance
- Performing Image Regression
- Using Deep Learning for Computer Vision
- Classifying Sequence Data
- Generating Sequences of Output

# Computer Vision with MATLAB

This one-day course provides hands-on experience with performing computer vision tasks with MATLAB and Computer Vision System Toolbox.

Topics included: importing, displaying and annotating videos, detecting objects, estimating direction and strength of motion, tracking objects, removing lens distortion and measuring planar objects.

## Prerequisites

MATLAB Fundamentals or equivalent experience using MATLAB. Image Processing with MATLAB and basic knowledge of image processing and computer vision concepts.

[Detailed course outline >>](#)

DURATION	LEVEL
1 Day	Medium
	

### TOPICS

## Day 1

- Importing, Visualizing, and Annotating Videos
- Detecting Objects
- Estimating Motion
- Tracking Objects
- Camera Calibration

# The Value of an Experienced Training Expert

Our training courses are developed by MathWorks' team of training engineers with exclusive product knowledge gained from working closely with product developers. They acquire significant hands-on experience by using new products months before they are released and are always current on new capabilities.

## Learn Relevant Skills

Each course contains a set of learning objectives designed to help participants quickly master necessary skills. Our hands-on approach allows participants to practice, apply, and evaluate their knowledge in the classroom.

## Receive Expert Instruction

Our training employs industry-accepted best practices for adult learning and technical instruction, and has developed course content that facilitates a "Presentation, Practice, Test" approach to learning. All training engineers have been selected based on their theoretical knowledge, technical education, experience, and teaching ability.

## Increase Team Success Rates

According to post-training surveys, teams who receive 40 hours of training meet project objectives three times as often as those who receive 30 hours or less. This increase in training time raises the likelihood of meeting objectives by 90%.



# Expand your knowledge

