

MATLAB Fundamentals for Aerospace Applications

Prerequisites

Undergraduate-level mathematics and experience with basic computer operations

Day 1 of 3

Working with the MATLAB User Interface	<p>Objective: Become familiar with the main features of the MATLAB integrated design environment and its user interfaces. Get an overview of course themes.</p> <ul style="list-style-type: none">Reading data from filesSaving and loading variablesPlotting dataCustomizing plotsExporting graphics for use in other applications
Variables and Commands	<p>Objective: Enter MATLAB commands, with an emphasis on creating variables, accessing and manipulating data in variables, and creating basic visualizations. Collect MATLAB commands into scripts for ease of reproduction and experimentation.</p> <ul style="list-style-type: none">Entering commandsCreating numeric and character variablesMaking and annotating plotsGetting helpCreating and running live scripts
Analysis and Visualization with Vectors	<p>Objective: Perform mathematical and statistical calculations with vectors. Use MATLAB syntax to perform calculations on whole data sets with a single command. Organize scripts into logical sections for development, maintenance, and publishing.</p> <ul style="list-style-type: none">Performing calculations with vectorsAccessing and modifying values in vectorsFormatting and sharing live scripts

Day 2 of 3

Analysis and Visualization with Matrices	<p>Objective: Use matrices as mathematical objects or as collections of (vector) data. Understand the appropriate use of MATLAB syntax to distinguish between these applications.</p> <ul style="list-style-type: none">Creating and manipulating matricesPerforming calculations with matricesCalculating statistics with matrix dataVisualizing matrix data
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Day 2 of 3

Tables of Data	<p>Objective: Import data as a MATLAB table. Work with data stored as a table.</p> <ul style="list-style-type: none">Storing data as a tableOperating on tablesExtracting data from tablesModifying tables
Conditional Data Selection	<p>Objective: Extract and analyze subsets of data that satisfy given criteria.</p> <ul style="list-style-type: none">Logical operations and variablesFinding and countingLogical indexing
Organizing Data	<p>Objective: Organize table data for analysis. Represent data using appropriate native MATLAB data types.</p> <ul style="list-style-type: none">Combining tables of dataTable metadataDates and durationsDiscrete categories

Day 3 of 3

Analyzing Data	<p>Objective: Perform typical data analysis tasks in MATLAB, including importing data from files, preprocessing data, fitting a model to data, and creating a customized visualization of the model.</p> <ul style="list-style-type: none">Importing from spreadsheets and delimited text filesDealing with missing dataPlotting functionsCustomizing plots
Increasing Automation with Programming Constructs	<p>Objective: Create flexible code that can interact with the user, make decisions, and adapt to different situations.</p> <ul style="list-style-type: none">Programming constructsUser interactionDecision branchingLoops

**Increasing
Automation
with
Functions**

Objective: Increase automation by encapsulating modular tasks as user-defined functions. Understand how MATLAB resolves references to files and variables. Use MATLAB development tools to find and correct problems with code.

- Creating functions
- Calling functions
- Setting the MATLAB path
- Debugging
- Using breakpoints
- Creating and using structures