# MATLAB Fundamentals

## Prerequisites

Undergraduate-level mathematics and experience with basic computer operations

| Day 1 of 3 | |
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| **Working with the MATLAB User Interface** | **Objective:** Become familiar with the main features of the MATLAB integrated design environment and its user interfaces. Get an overview of course themes.<br>• Reading data from files<br>• Saving and loading variables<br>• Plotting data<br>• Customizing plots<br>• Exporting graphics for use in other applications |
| **Variables and Commands** | **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.<br>• Entering commands<br>• Creating numeric and character variables<br>• Making and annotating plots<br>• Getting help<br>• Creating and running live scripts |
| **Analysis and Visualization with Vectors** | **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.<br>• Performing calculations with vectors<br>• Accessing and modifying values in vectors<br>• Formatting and sharing live scripts |

| Day 2 of 3 | |
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| **Analysis and Visualization with Matrices** | **Objective:** Use matrices as mathematical objects or as collections of (vector) data. Understand the appropriate use of MATLAB syntax to distinguish between these applications.<br>• Creating and manipulating matrices<br>• Performing calculations with matrices<br>• Calculating statistics with matrix data<br>• Visualizing matrix data |
| **Tables of Data** | **Objective:** Import data as a MATLAB table. Work with data stored as a table.<br>• Storing data as a table<br>• Operating on tables<br>• Extracting data from tables<br>• Modifying tables |
| **Conditional Data Selection** | **Objective:** Extract and analyze subsets of data that satisfy given criteria.<br>• Logical operations and variables<br>• Finding and counting<br>• Logical indexing |
| **Organizing Data** | **Objective:** Organize table data for analysis. Represent data using appropriate native MATLAB data types.<br>• Combining tables of data<br>• Table metadata<br>• Dates and durations<br>• Discrete categories |

| Day 3 of 3 | |
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| **Analyzing Data** | **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.<br>• Importing from spreadsheets and delimited text files<br>• Dealing with missing data<br>• Plotting functions<br>• Customizing plots |
| **Increasing Automation with Programming Constructs** | **Objective:** Create flexible code that can interact with the user, make decisions, and adapt to different situations.<br>• Programming constructs<br>• User interaction<br>• Decision branching<br>• Loops |
| **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.<br>• Creating functions<br>• Calling functions<br>• Setting the MATLAB path<br>• Debugging<br>• Using breakpoints<br>• Creating and using structures |