Course Title:

MATLAB Fundamentals

Course Purpose:

This three-day course provides a comprehensive introduction to the MATLAB®
technical computing environment. The course is intended for beginning users and
those looking for a review. No prior programming experience or knowledge of
MATLAB is assumed. Themes of data analysis, visualization, modeling, and
programming are explored throughout the course. Topics include:

- Working with the MATLAB user interface
- Entering commands and creating variables
- Analyzing vectors and matrices
- Visualizing vector and matrix data
- Working with data files
- Working with data types
- Automating commands with scripts
- Writing programs with logic and flow control
- Writing functions

Pre- requisites:

Undergraduate-level mathematics and experience with basic computer operations.

Course Duration

- ✓ 3 training days
- ✓ Hours: 09:00-17:00
- ✓ Total training hours: 24

Teaching method

The course combines lectures, demonstrations and practical exercises in MATLAB, using
original training books from MathWorks. The course is in Hebrew but the training
materials are in English.

Training Center Systematics - Contact information:
Phone number: 03-7660111 Ext: 5 **Email:** training@systematics.co.il
Website: http://www.systematics.co.il/mathworks

Course Objective:

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.

- Reading data from files
- Saving and loading variables
- Plotting data
- Customizing plots
- Calculating statistics and best-fit line
- Exporting graphics for use in other applications

Variables and Expressions

Objective: Enter MATLAB commands, with an emphasis on creating variables, accessing and manipulating data in vector variables, and creating basic visualizations.

- Entering commands
- Creating numeric variables
- Creating character variables
- Making and annotating plots
- Getting help
- Accessing and modifying values in variables

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.

- Performing calculations with vectors
- Creating multiple plots

Automating Commands with Scripts

Objective: Collect MATLAB commands into scripts for ease of reproduction and experimentation. Divide scripts into logical sections for development, maintenance, and publishing.

- Using the Command History
- Creating script files
- Running scripts
- Dividing code into sections
- Publishing scripts

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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.

- Creating and manipulating matrices
- Performing calculations with matrices
- Calculating statistics with matrix data
- Visualizing matrix data

Dates and Times

Objective: Use variables to represent and manipulate dates and time durations. Extract components of dates and durations as numeric variables.

- Representing dates and durations
- Performing calculations with dates and durations
- Plotting with dates
- Extracting numeric components of dates and durations

Tables of Data

Objective: Import data as a MATLAB table. Work with data stored as a table.

- Storing data as a table
- Operating on tables
- Extracting data from tables
- Modifying table

Conditional Data Selection

Objective: Extract and analyze subsets of data that satisfy given criteria.

- Logical operations and variables
- Finding and counting
- Logical indexing

Analyzing Data from Files

Objective: Perform typical data analysis tasks in MATLAB, including importing data from file, preprocessing data, fitting a model to data, and creating a customized visualization of the model.

- Importing from spreadsheets and delimited text files
- Dealing with missing data
- Plotting functions
- Customizing plots

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Flow Control

Objective: Create flexible code that can interact with the user, make decisions, and adapt to different situations.

- Programming constructs
- User interaction
- Flow control
- Loops

Writing 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 with the MATLAB Editor
- Using breakpoints
- Creating and using structures

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