



Jagadish Chandra Bose Research Centre
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Summer Training on Matlab and Applications

This course is intended for beginning users and those looking for a review. No prior programming experience or knowledge of MATLAB is assumed, and the course is structured to allow thorough assimilation of ideas through hands-on examples and exercises. MATLAB competency is developed in a natural way, with an emphasis on practical application. Themes of data analysis, visualization, modeling, and programming are explored throughout the course.

Course Duration: 30/45 Days

Course Content:

1. INTRODUCTION to MATLAB

- Historical Background
- Applications
- Scope of MATLAB
- Importance of MATLAB for Engineers
- Features
- MATLAB Windows(Editor, Work Space, Command History, Command Window)
- Operations with Variables
- Naming and Checking Existence
- Clearing Operations
- Introduction to Arrays
- MATLAB File Types

2. DATA and DATA FLOW in MATLAB

- Matrix Operations & Operators
- Reshaping Matrices
- Importing Exporting Of Data
- Arrays
- Data types
- File Input-Output



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- Communication with External Devices

3. EDITING and DEBUGGING M FILES

- Writing Script Files
- Writing Functions
- Error Correction
- M-Lint Automatic Code Analyzer
- Saving Files

4. PROGRAMMING

- Flow Control
- Conditional Statements
- Error Handling
- Work with Multidimensional Array
- Cell Array & Characters
- Developing User Defined Function
- Scripts and Other Functions

5. MATLAB GRAPHICS

- Simple Graphics
- Graphic Types
- Plotting Functions
- Creating Plot & Editing Plot(2D and 3D)
- Graphics Handles

6. DETAILED ANALYSIS of CONTROL SYSTEM TOOLBOX

- General Instructions
- Creation of Linear Models
- Classes of Control System Toolbox
- Discussion on State Space Representation
- Transfer Function
- System Gain and Dynamics
- Time & Frequency Domain Analysis
- Classical Design, State Space Model
- Transfer Function Representation, System Response
- LTI Viewer Detail and Explanation About LTI Viewer
- Designing of Compensator
- Use of SISO Design & MIMO Design Tool

7. SIMULINK



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- Introduction
 - Importance
 - Model Based Design
 - Tools
 - Mathematical Modeling
 - Converting Mathematical Model into Simulink Model
 - Running Simulink Models
 - Importing Exporting Data
 - Solver Configuration
 - Masking Block/Model

8. DETAILED ANALYSIS OF COMMUNICATION TOOLBOX

- Signal Sources
- BER Tool
- Modulation
- Special Filter
- Channels
- Equalizers

9. DETAILED ANALYSIS OF SIGNAL PROCESSING TOOLBOX

- Basics of Signal Processing
- Representing Signals
- Analysis of different Signals
- Complex Signals
- Filter Designing
- Using the Filter Designing GUIs
- Analyzing the filter plots
- Filter Designing using Script Files
- Other Signal Processing Functions

10. DETAILED ANALYSIS OF IMAGE PROCESSING TOOLBOX

- Reading and Writing Image Data
- Displaying and Exploring Image
- Spatial Transformation
- Image Registration
- Designing and implementing 2D linear Filters for Image Data
- Morphological Operations
- Transforms
- Analyzing and Enhancing Images
- ROI based Processing
- Neighborhood and Block operations



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11. PROJECT

- All students will get complete simulation of one IEEE PAPER of their choice based on MATLAB.

Projects Covered

- Different Sound Generation
- Filter Designing
- Real time audio recording
- Speech Processing
- Video Capturing and processing
- Real time Color Tracking
- Controller Design
- AM/FM Modulation
- ASK/FSK/PSK Modulation
- PAM, PPM, PWM Modulation

Who Could Attend?

- College students seeking future in Research and Technical Computing.
- Electronics, Instrumentation & Communications Students.
- Students from any branch can attend the Summer Training Program.

Course Material & CD

- Software tool kit CD having (Study E-Book, Videos, Softwares)