



Department of Computer Science & Engineering &



Malnad Enclave for Research, Innovation, Incubation, Startups & Entrepreneurship (ME-RIISE)

Course Outline

Week 1	MATLAB Fundamentals 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 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. Entering commands Creating numeric and character variables Making and annotating plots Getting help Creating and running live scripts
Week 2	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. Performing calculations with vectors Accessing and modifying values in vectors Formatting and sharing live scripts 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



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	<p>Visualizing matrix data - 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 tables</p>
Week 3	<p>Organizing Data Objective: Organize table data for analysis. Represent data using appropriate native MATLAB data types. Combining tables of data Table metadata Dates and durations Discrete categories 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. Importing from spreadsheets and delimited text files Dealing with missing data Plotting functions Customizing plots</p>
Week 4	<p>Increasing Automation with Programming Constructs Objective: Create flexible code that can interact with the user, make decisions, and adapt to different situations. Programming constructs User interaction Decision branching 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. Creating functions Calling functions</p>



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	Setting the MATLAB path Debugging with the MATLAB Editor Using breakpoints Creating and using structures
	SIMULINK Fundamentals
Week 5	Simulink for System and Algorithm Modeling Training Objectives This course is for engineers who are new to system and algorithm modeling and design validation in Simulink®. It demonstrates how to apply basic modeling techniques and tools to develop Simulink block diagrams. Topics include: Creating and modifying Simulink models and simulating system dynamics Modeling continuous-time, discrete-time, and hybrid systems Modifying solver settings for simulation accuracy and speed Building hierarchy into a Simulink model Creating reusable model components using subsystems, libraries, and model references. If your application is signal processing or communications, please refer to the Simulink for Signal Processing course. Creating and Simulating a Model Objective: Create a simple Simulink model, simulate it, and analyze the results. Introduction to the Simulink interface Potentiometer system System inputs and outputs Simulation and analysis
Week 6	Modeling Programming Constructs Objective: Model and simulate basic programming constructs in Simulink. Comparisons and decision statements Vector signals PWM conversion system Zero crossings MATLAB Function block Modeling Discrete Systems Objective: Model and simulate discrete systems in Simulink. Discrete signals and states PI controller system



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	Discrete transfer functions and state-space systems Multirate discrete systems
Week 7	Modeling Continuous Systems Objective: Model and simulate continuous systems in Simulink. Continuous states Throttle system Continuous transfer functions and state-space systems Physical boundaries Solver Selection Objective: Select a solver that is appropriate for a given Simulink model. Solver behavior System dynamics Discontinuities Algebraic loops Developing Model Hierarchy Objective: Use subsystems to combine smaller systems into larger systems. Subsystems Bus signals Masks
Week 8	Modeling Conditionally Executed Algorithms Objective: Create subsystems that are executed based on a control signal input. Conditionally executed subsystems Enabled subsystems Triggered subsystems Input validation model Combining Models into Diagrams Objective: Use model referencing to combine models. Subsystems and model referencing Model referencing workflow Model reference simulation modes Model workspaces Model dependencies Creating Libraries Objective: Use libraries to create and distribute custom blocks. Creating and populating libraries



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Managing library links

Adding a library to the Simulink Library Browser.
