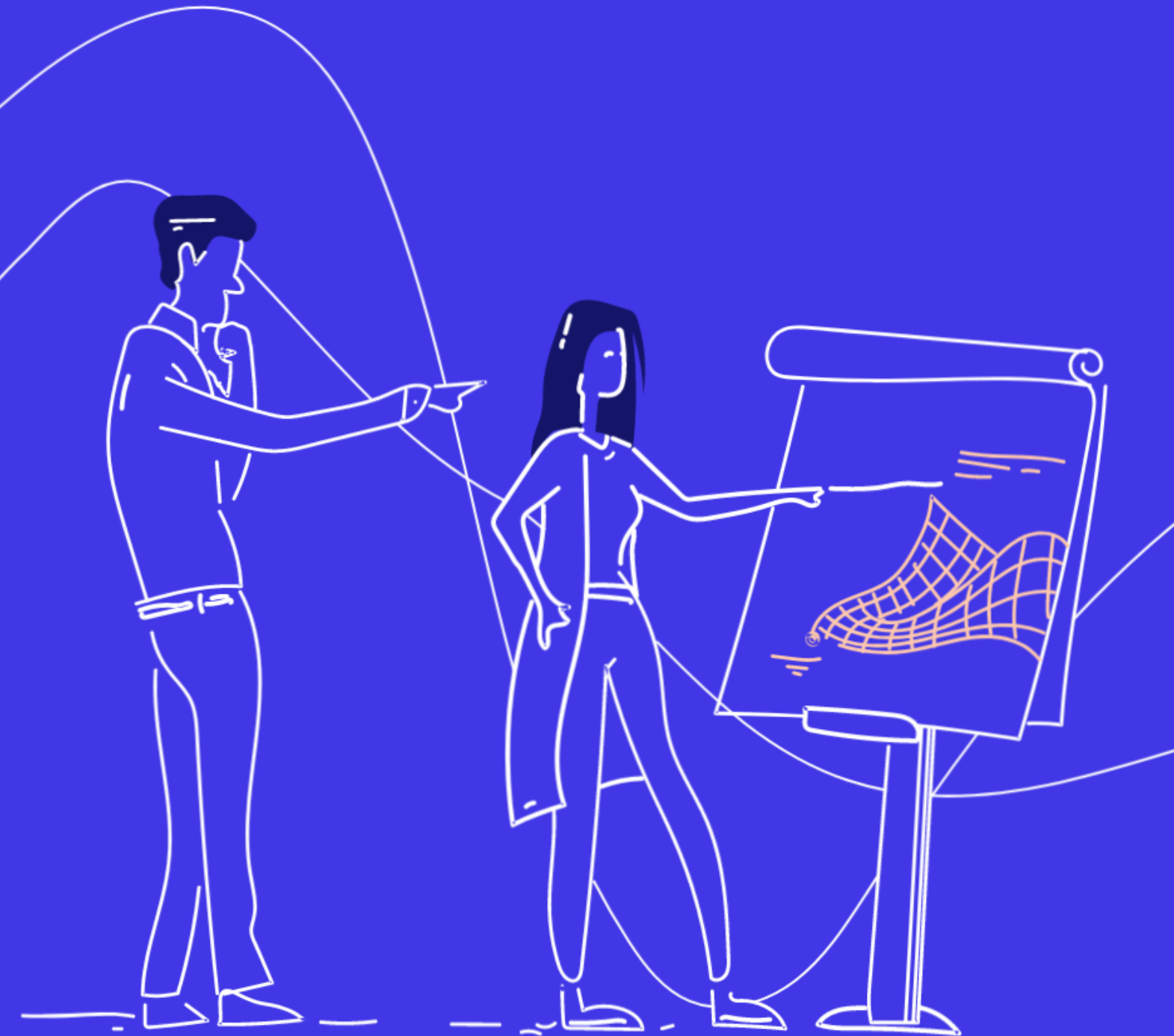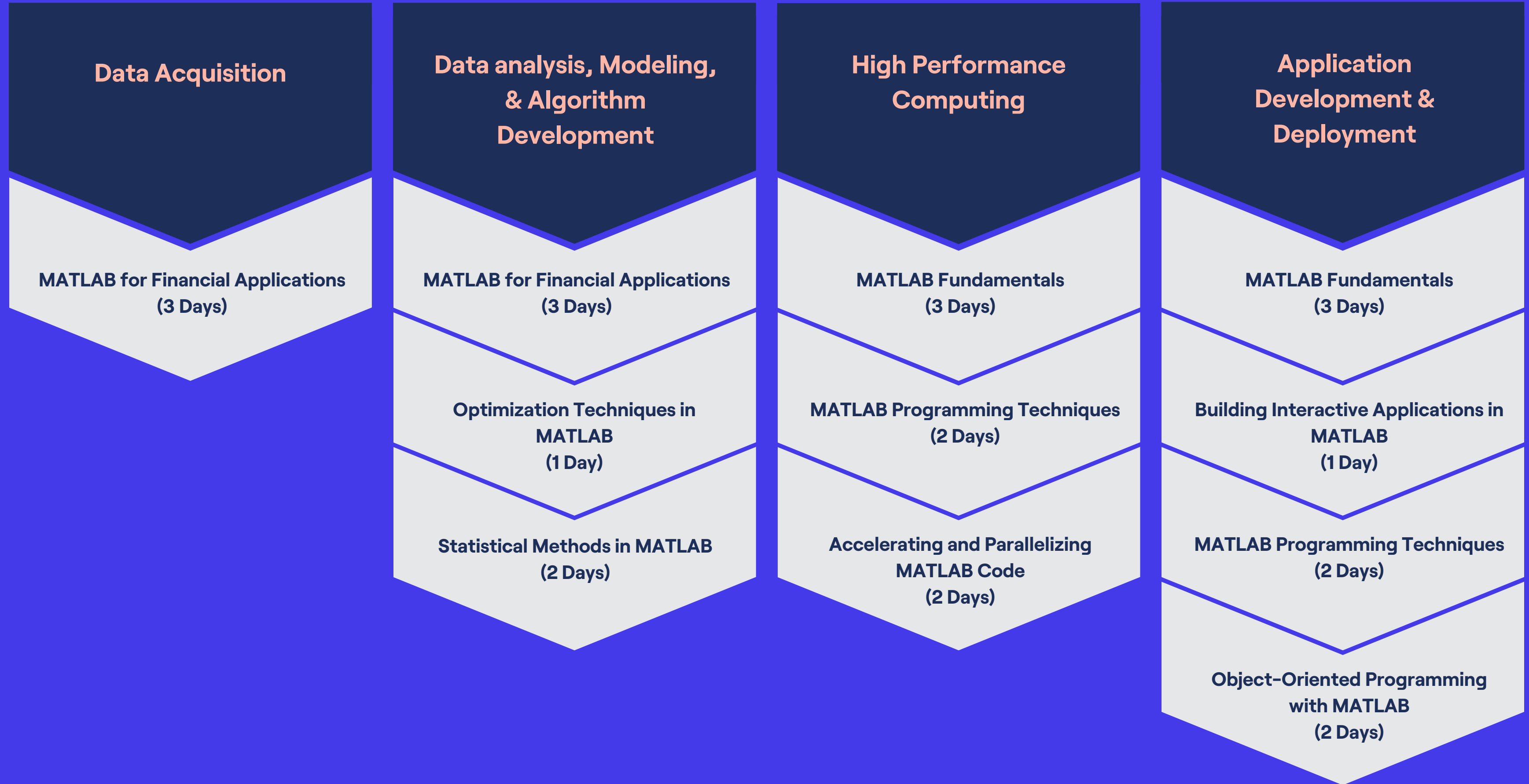# sciengineer

Algorithmic Trading Curriculum

SciEngineer's training courses are designed to help organizations and individuals close skills gaps, keep up-to-date with the industry-accepted best practices and achieve the greatest value from MathWorks® and COMSOL® Products.

Data Acquisition

MATLAB for Financial Applications
(3 Days)

Data analysis, Modeling, & Algorithm Development

MATLAB for Financial Applications
(3 Days)

Optimization Techniques in MATLAB
(1 Day)

Statistical Methods in MATLAB
(2 Days)

High Performance Computing

MATLAB Fundamentals
(3 Days)

MATLAB Programming Techniques
(2 Days)

Accelerating and Parallelizing MATLAB Code
(2 Days)

Application Development & Deployment

MATLAB Fundamentals
(3 Days)

Building Interactive Applications in MATLAB
(1 Day)

MATLAB Programming Techniques
(2 Days)

Object-Oriented Programming with MATLAB
(2 Days)

Development Process Support

Simulink Fundamentals
(2 Days)

Simulink Model Management
and Architecture
(2 Days)

Integrating Code with Simulink
(1 Day)

Embedded Coder for Production
Code Generation
(3 Days)

MATLAB for Financial Applications

This three-day course provides a comprehensive introduction to the MATLAB technical computing environment for financial professionals. Themes of data analysis, visualization, modeling, and programming are explored throughout the course, with an emphasis on practical application to finance, such as time-series analysis, Monte Carlo simulation, portfolio management, and empirical modeling. The course is intended for beginning users and those looking for a review.

Prerequisites

Undergraduate-level mathematics and experience with basic computer operations.

Detailed course outline »

DURATION

3 Days

LEVEL

Basic

TOPICS

Day 1

- Working with the MATLAB User Interface
- Variables and Commands
- Visualizing Results
- Data Analysis

Day 2

- Dates and Times
- Working with Tabular Data
- Conditional Data Selection
- Programming Flow Control

Day 3

- Working with Missing Data
- Customizing Graphics
- Fitting Models to Empirical Data
- Increasing Automation with Functions

MATLAB for Data Processing and Visualization

This one-day course focuses on importing and preparing data for data analytics applications. Topics discussed include importing data from multiple sources, processing data, producing informative customized graphics and working with irregular data.

Prerequisites

MATLAB Fundamentals

Detailed course outline »

DURATION	LEVEL
1 day	Medium

TOPICS

Day 1

- Importing Data
- Processing Data
- Customizing Visualizations
- Working with Irregular Data

Optimization Techniques in MATLAB

This one-day course introduces applied optimization in the MATLAB environment using Optimization Toolbox and Global Optimization Toolbox. The course focuses on problem defining, objective functions writing, constraints defining, solver choosing and optimizations methods using.

Prerequisites

MATLAB Fundamentals. Knowledge of linear algebra and multivariate calculus is helpful.

Detailed course outline »

DURATION

1 day

LEVEL

Medium

TOPICS

Day 1

- Running an Optimization Problem
- Specifying the Objective Functions and Constraints
- Choosing a Solver and Improving Performance
- Global and Multiobjective Optimization

Statistical Methods in MATLAB

This two-day course focuses on performing statistical data analysis with MATLAB and Statistics and Machine Learning Toolbox. Examples and exercises demonstrate the use of appropriate MATLAB and Statistics and Machine Learning Toolbox functionality throughout the analysis process; from importing and organizing data, to exploratory analysis, to confirmatory analysis and simulation.

Prerequisites

MATLAB Fundamentals and knowledge of basic Statistics and Machine Learning Toolbox.

Detailed course outline »

DURATION

2 Days

LEVEL

Medium

TOPICS

Day 1

- Importing and Organizing Data
- Exploring Data
- Distributions
- Hypothesis Tests

Day 2

- Analysis of Variance
- Regression
- Working with Multiple Dimensions
- Random Numbers and Simulation

MATLAB Fundamentals

This three-day course provides a comprehensive introduction to the MATLAB technical computing environment. Themes of data analysis, visualization, modeling, and programming are explored throughout the course. This course is intended for beginning users and those looking for a review.

Prerequisites

Undergraduate-level mathematics and experience with basic computer operations.

Detailed course outline »

DURATION

3 Days

LEVEL

Basic

TOPICS

Day 1

- Working with the MATLAB User Interface
- Variables and Commands
- Analysis and Visualization with Vectors

Day 2

- Analysis and Visualization with Matrices
- Tables of Data
- Conditional Data Selection
- Organizing Data

Day 3

- Analyzing Data
- Increasing Automation with Programming Constructs
- Increasing Automation with Functions

MATLAB Programming Techniques

This two-day course provides hands-on experience using the features in the MATLAB language to write efficient, robust, and well-organized code. These concepts form the foundation for writing full applications, developing algorithms, and extending built-in MATLAB capabilities. Details of performance optimization, as well as tools for writing, debugging, and profiling code are covered.

Prerequisites

MATLAB Fundamentals or equivalent experience using MATLAB

Detailed course outline »

DURATION | LEVEL

2 Days | Medium

TOPICS

Day 1

- Structuring Data
- Managing Data Efficiently
- Utilizing Development Tools

Day 2

- Creating Robust Applications
- Structuring Code
- Verifying Application Behavior

Accelerating and Parallelizing MATLAB Code

This two-day course covers a variety of techniques for making your MATLAB code run faster. You will identify and remove computational bottlenecks using techniques like pre-allocation and vectorization. In addition, you will compile MATLAB code into MEX-files using MATLAB Coder. On top of that, you will take advantage of multiple cores on your computer by parallelizing for-loops with Parallel Computing Toolbox and scale up across multiple computers using MATLAB Parallel Server.

Prerequisites

MATLAB Fundamentals, or equivalent experience using MATLAB

Detailed course outline »

DURATION

2 Days

LEVEL

Medium

TOPICS

Day 1

- Improving Performance
- Generating MEX-Files
- Parallelizing Computations

Day 2

- Parallel for-Loops
- Offloading Execution
- Working with Clusters
- GPU Computing

Building Interactive Applications in MATLAB

This one-day course demonstrates how to create an interactive user interface for your applications in the App Designer environment. You will learn about user interface controls, responsive components, extra dialog windows and how to use them to create a robust and user-friendly interface for your MATLAB app. No prior experience of programming graphical interfaces is required.

Prerequisites

MATLAB Fundamentals

Detailed course outline »

DURATION | LEVEL

1 Day | Medium

TOPICS

Day 1

- Using the App Designer Environment
- Creating and Updating Plots
- Creating Responsive Components
- Managing Multiple Windows and Apps

Object-Oriented Programming with MATLAB

This two-day course focuses on using object-oriented programming techniques to develop and maintain complex MATLAB applications. The main topics are creating custom data types, desingining a MATLAB class, building class hierarchies, facilitating multiple references, writing unit tests and syncronizing objects.

Prerequisites

MATLAB Programming Techniques or equivalent experience using MATLAB

Detailed course outline »

DURATION | LEVEL

2 Days | Medium

TOPICS

Day 1

• Creating Custom Data Types
• Designing a MATLAB Class
• Building Class Hierarchies

Day 2

• Facilitating Multiple References
• Writing Unit Tests
• Synchronizing Objects

Optimization Techniques in MATLAB

This one-day course introduces applied optimization in the MATLAB environment using Optimization Toolbox and Global Optimization Toolbox. The course focuses on problem defining, objective functions writing, constraints defining, solver choosing and optimizations methods using.

Prerequisites

MATLAB Fundamentals. Knowledge of linear algebra and multivariate calculus is helpful.

Detailed course outline »

DURATION

1 day

LEVEL

Medium

TOPICS

Day 1

- Running an Optimization Problem
- Specifying the Objective Functions and Constraints
- Choosing a Solver and Improving Performance
- Global and Multiobjective Optimization

Simulink Fundamentals

This two-day course provides a comprehensive introduction to the Simulink environment. It demonstrates how to create, modify Simulink models, improve simulation accuracy and speed and create reusable model components using subsystems, model references and libraries.

Prerequisites

MATLAB Fundamentals

Detailed course outline »

DURATION

2 Days

LEVEL

Basic

TOPICS

Day 1

- Creating and Simulating a Model
- Modeling Programming Constructs
- Modeling Discrete Systems
- Modeling Continuous Systems

Day 2

- Solver Selection
- Developing Model Hierarchy
- Modeling Conditionally Executed Algorithms
- Combining Models into Diagrams
- Creating Libraries

Simulink Model Management and Architecture

Prerequisites

This two-day course describes techniques for applying ModelBased Design in a common design workflow. It provides guidance on managing and sharing Simulink models when working in a large-scale project environment. This course is intended for intermediate or advanced Simulink users.

MATLAB Fundamentals and Simulink Fundamentals. This course is intended for intermediate or advanced Simulink users.

Detailed course outline »

DURATION

2 Days

LEVEL

Advanced

TOPICS

Day 1

- Model-Based Design
- Requirements Linking and Interface Control
- Model Architecture
- Project Management

Day 2

- Data Management
- Data Customization
- Modeling Standards
- Reporting

Integrating Code with Simulink

This one-day course presents multiple methods for integrating C code and MATLAB code into Simulink models. Topics discussed include writing C MEX S-functions, integrating MATLAB code, and the Legacy Code Tool for wrapping external C functions into Simulink.

Prerequisites

Simulink Fundamentals, MATLAB Fundamentals, and knowledge of C programming

Detailed course outline »

DURATION

1 day

LEVEL

Medium

TOPICS

Day 1

- Code Integration Methods
- Transitioning from MATLAB to Simulink
- Calling External Routines
- Writing Wrapper S-Functions
- Code Generation Considerations
- Code Integration Methods Review

Embedded Coder for Production Code Generation

This three-day course describes techniques for generating, validating, and customizing embedded code using Embedded Coder.

Topics include: Generated code structure and execution; Code generation options and optimizations; Integrating generated code with external code; Generating code for multirate systems; Customizing generated code and data.

Prerequisites

- Simulink Fundamentals (or Simulink Fundamentals for Automotive Applications or Simulink Fundamentals for Aerospace Applications)
- Knowledge of C programming language.

Detailed course outline »

DURATION	LEVEL
3 Days	Medium

TOPICS

Day 1

- Generating Embedded Code
- Optimizing Generated Code
- Integrating Generated Code with External Code
- Controlling Function Prototypes

Day 2

- Customizing Data Characteristics in Simulink®
- Customizing Data Characteristics Using Data Objects
- Creating Storage Classes
- Customizing Generated Code Architecture
- Model Referencing and Bus Objects

Day 3

- Scheduling Generated Code Execution
- Testing Generated Code on Target Hardware
- Deploying Generated Code
- Integrating Device Drivers
- Improving Code Efficiency and Compliance

The Value of an Experienced Training Expert

Our training courses are developed by MathWorks' team of training engineers with exclusive product knowledge gained from working closely with product developers. They acquire significant hands-on experience by using new products months before they are released and are always current on new capabilities.

Learn Relevant Skills

Each course contains a set of learning objectives designed to help participants quickly master necessary skills. Our hands-on approach allows participants to practice, apply, and evaluate their knowledge in the classroom.

Receive Expert Instruction

Our training employs industry-accepted best practices for adult learning and technical instruction, and has developed course content that facilitates a "Presentation, Practice, Test" approach to learning. All training engineers have been selected based on their theoretical knowledge, technical education, experience, and teaching ability.

Increase Team Success Rates

According to post-training surveys, teams who receive 40 hours of training meet project objectives three times as often as those who receive 30 hours or less. This increase in training time raises the likelihood of meeting objectives by 90%.