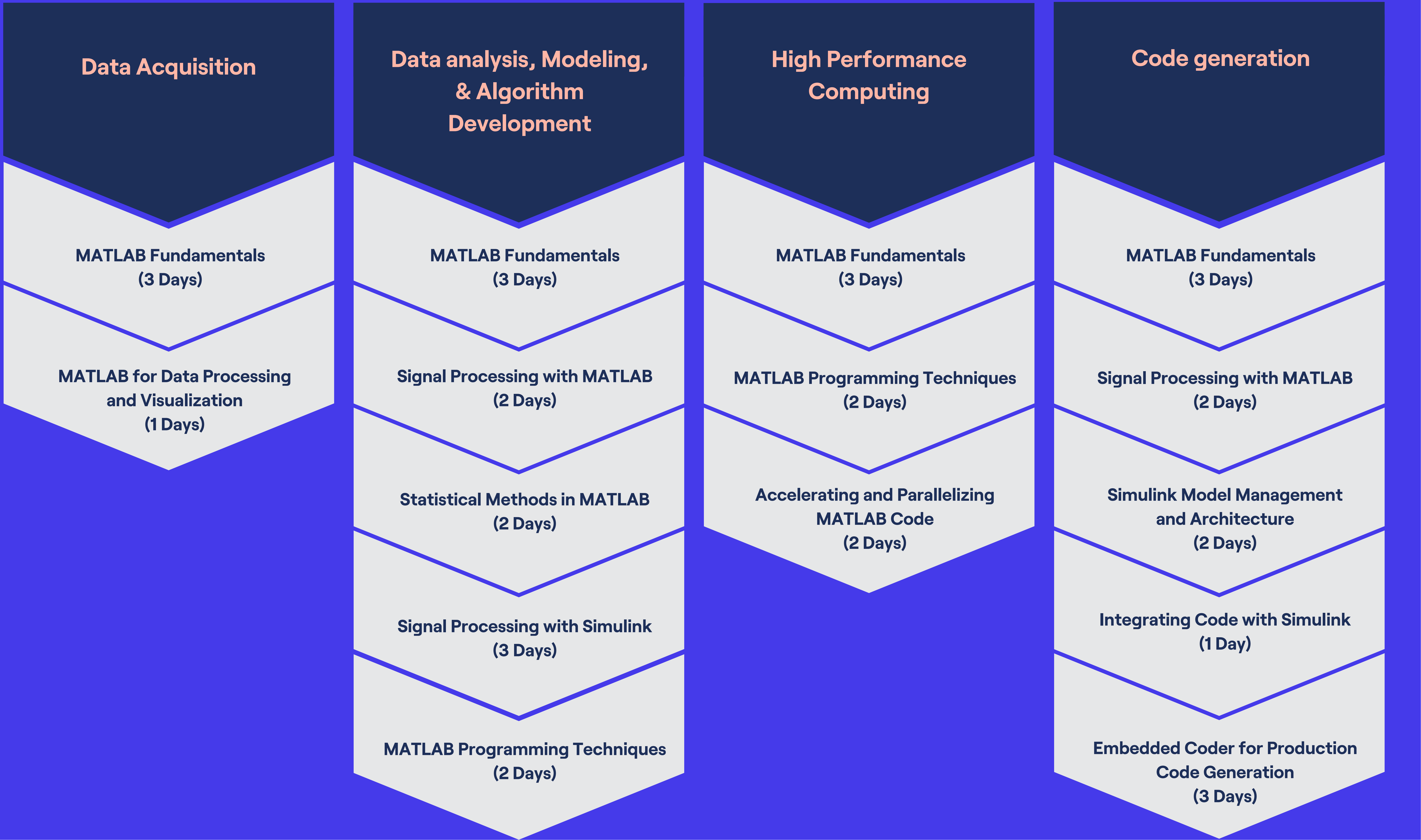
sciengineer

Biomedical Signal Processing and Data Analysis

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.

Biomedical Signal Processing and Data Analysis



Data Acquisition

MATLAB Fundamentals
(3 Days)

MATLAB for Data Processing and Visualization
(1 Days)

Data analysis, Modeling, & Algorithm Development

MATLAB Fundamentals
(3 Days)

Signal Processing with MATLAB
(2 Days)

Statistical Methods in MATLAB
(2 Days)

Signal Processing with Simulink
(3 Days)

MATLAB Programming Techniques
(2 Days)

High Performance Computing

MATLAB Fundamentals
(3 Days)

MATLAB Programming Techniques
(2 Days)

Accelerating and Parallelizing MATLAB Code
(2 Days)

Code generation

MATLAB Fundamentals
(3 Days)

Signal Processing with MATLAB
(2 Days)

Simulink Model Management and Architecture
(2 Days)

Integrating Code with Simulink
(1 Day)

Embedded Coder for Production Code Generation
(3 Days)

SciEngineer’s Training Services

Code Verification

Polyspace for C/C++ Code Verification
(3 Days)

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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	LEVEL
3 Days	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

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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

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Signal Processing with MATLAB

This two-day course shows how to analyze signals and design signal processing systems using MATLAB and Signal Processing Toolbox. Parts of the course also use DSP System Toolbox. This course focuses on creating and analyzing signals, performing spectral analysis, designing and analyzing filters, designing multirate and adaptive filters.

Prerequisites

MATLAB Fundamentals or equivalent experience using MATLAB, and a good understanding of signal processing theory, including linear systems, spectral analysis, and filter design

Detailed course outline »

DURATION	LEVEL
2 days	Medium
●●○	▬▬▭

TOPICS

Day 1

- Signals in MATLAB
- Spectral Analysis
- Linear Time Invariant Systems

Day 2

- Filter Design
- The Signal Analysis App
- Multirate Filters
- Adaptive Filter Design

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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	LEVEL
2 Days	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

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Signal Processing with Simulink

This three-day course provides an understanding of how to design signal processing systems and process data in Simulink. Through basic modeling techniques and tools, it shows how to develop Simulink block diagrams for signal processing applications. This course is intended for beginning Simulink users and those looking for a review.

Prerequisites

MATLAB Fundamentals and basic knowledge of digital signal processing.

Detailed course outline »

DURATION	LEVEL
3 Days	Basic
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TOPICS

Day 1

- What is Simulink?
- Creating and Simulating a Model
- Modeling Discrete Dynamic Systems
- Modeling Logical Constructs
- From Algorithm to Mode

Day 2

- Mixed-Signal Models
- Simulink Solvers
- Subsystems and Libraries
- Conditional Subsystems
- Spectral Analysis

Day 3

- Designing and Applying Filters
- Multirate Systems
- Incorporating External Code
- Combining Models into Diagrams
- Automating Modeling Tasks

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

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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	LEVEL
2 Days	Medium
● ● ●	▬ ▬ ▬

TOPICS

Day 1

- Improving Performance
- Generating MEX-Files
- Parallelizing Computations

Day 2

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

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Simulink Model Management and Architecture

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.

Prerequisites

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

Detailed course outline »

DURATION	LEVEL
2 Days	Advanced
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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

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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 optimalizations; 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

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Polyspace for C/C++ Code Verification

This two-day course discusses the use of Polyspace Code Prover to prove code correctness, improve software quality metrics, and ensure product integrity. This course describes techniques for creating a verification project, reviewing and understanding verification results, emulating target execution environments, handling missing functions and data, managing unproven code, applying MISRA-C rules and reporting analysis results.

Prerequisites

Strong knowledge of C or C++

Detailed course outline »

DURATION	LEVEL
3 days	Advanced
●●●	▬▬▬

TOPICS

Day 1

- Polyspace Workflow Overview
- Polyspace Bug Finder Analysis
- Analyzing Polyspace Code Prover Results
- Code Verification Checks

Day 2

- Managing Polyspace Code Prover Verifications and Results
- Adding Precision to Polyspace Code Prover Verifications
- Integration Analysis
- Application Analysis

Day 3

- (optional, available with private training only)
- Hands-On Instruction (Optional)

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%.

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Expand your knowledge