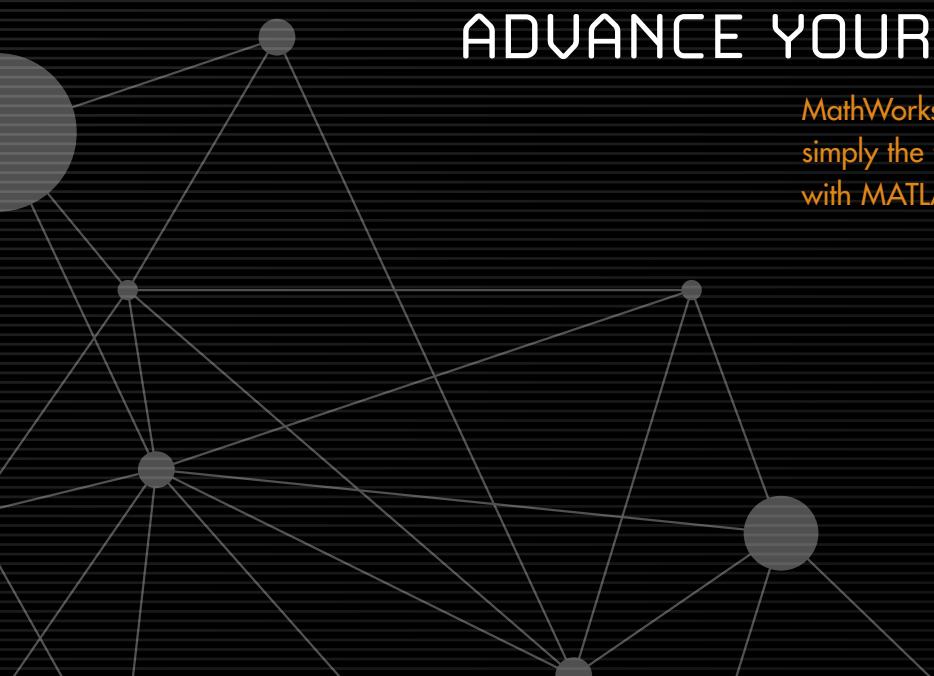




ENHANCE YOUR SKILLS
ADVANCE YOUR CAREER



2012



ENHANCE YOUR SKILLS ADVANCE YOUR CAREER

MathWorks training delivers true business value. It's simply the fastest way to build expertise and efficiency with MATLAB® and Simulink®.

TRAINING OPTIONS

There are many ways to receive training: at a public location, online, or at your own work site. For details and a full schedule, visit mathworks.com/2012training.

Public training. Learn in a focused classroom setting. More than 30 courses are offered at MathWorks facilities and public sites around the world.

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MATLAB CERTIFICATION

MATLAB Certification establishes a standard of excellence that demonstrates your MATLAB proficiency to customers, industry peers, and your employer. For organizations, certification is a strategic investment that pays off through increased productivity and project success. For individuals, certification can help accelerate professional growth and achievement.

MATLAB training helps you prepare for certification; exam questions reflect concepts taught in MATLAB courses.

Certification is available in two levels:

- MATLAB Certified Associate
- MATLAB Certified Professional

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MathWorks developed courses are built on exclusive product knowledge. Course developers and instructors work with product developers every day to gain exposure to new product capabilities. This unique insight is shared with you through official courseware that incorporates the most useful tips and techniques.

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No other training provider can match MathWorks for the breadth and quality of the curricula, the variety of training options, and instructor expertise. Together, they make MathWorks the single best choice for MATLAB and Simulink training.

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Maximize your training budget by purchasing training credits, which give you discounts on future courses. You can apply credits to any public, onsite, or e-learning training course within one year of purchase. Contact your local sales representative to learn more.

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United Kingdom: +44 1223 226700

Fees include all course materials. Payment must be received at the time of registration to ensure your seat in the course.



The MathWorks BV is a Cedeo-approved training organization.



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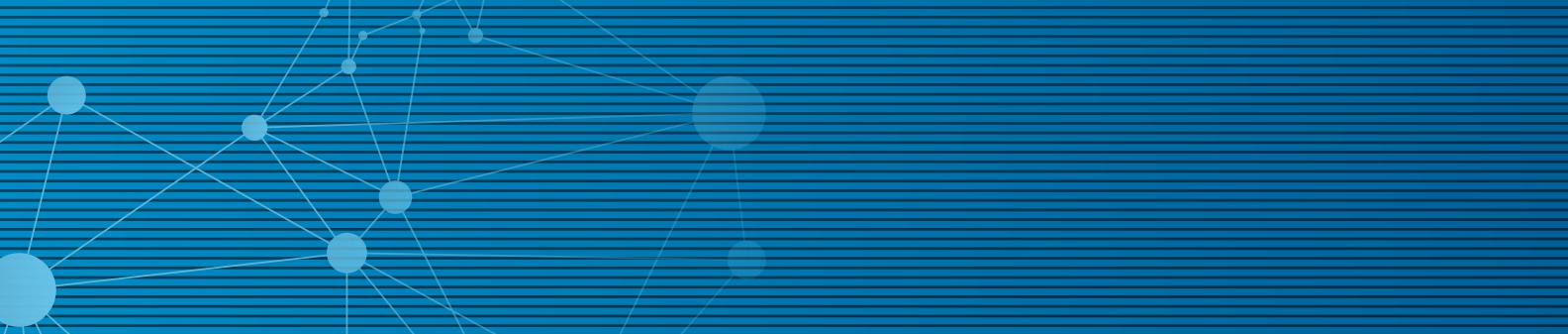
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MATLAB

MATLAB Fundamentals

FUNDAMENTAL

Communication Systems - Computational Biology - Computational Finance - Control Systems - Digital Signal Processing - Embedded Systems - Image and Video Processing - Mechatronics - Technical Computing - Test and Measurement

This three-day course provides a comprehensive introduction to the MATLAB technical computing environment. This course is intended for beginning users and those looking for a review. Topics include:

- Data analysis
- Visualization
- Modeling
- Programming

Prerequisites: Undergraduate-level mathematics and experience with basic computer operations

MATLAB Fundamentals for Aerospace Applications

FUNDAMENTAL

Technical Computing

Based on the *MATLAB Fundamentals* outline, this three-day course offers hands-on aerospace examples and exercises that apply basic techniques to realistic problems in a variety of aerospace and defense applications.

Prerequisites: Undergraduate-level mathematics and experience with basic computer operations

MATLAB Fundamentals for Automotive Applications

FUNDAMENTAL

Technical Computing

Based on the *MATLAB Fundamentals* outline, this three-day course offers hands-on automotive examples and exercises that apply basic techniques to realistic problems in the automotive industry.

Prerequisites: Undergraduate-level mathematics and experience with basic computer operations

MATLAB Fundamentals for Financial Applications

FUNDAMENTAL

Computational Finance

Based on the *MATLAB Fundamentals* outline, this three-day course offers hands-on examples and exercises that apply basic techniques to financial applications. Topics include:

- Time-series analysis
- Fixed-income security valuation
- Portfolio management
- Options and derivatives
- Monte Carlo simulation

Prerequisites: Undergraduate-level mathematics, experience with basic computer operations, and knowledge of basic financial terminology and modeling techniques

MATLAB for Data Processing and Visualization

INTERMEDIATE

Computational Finance - Image and Video Processing - Technical Computing

This one-day course focuses on the details of data management and visualization techniques, from reading various formats of data files to producing customized publication-quality graphics. The course emphasizes creating scripts that extend the basic features provided by MATLAB. Topics include:

- Importing data
- Organizing data
- Visualizing data
- Exporting data

Prerequisites: *MATLAB Fundamentals*

MATLAB Programming Techniques

INTERMEDIATE

Technical Computing

This one-day course covers details of performance optimization as well as tools for writing, debugging, and profiling code. Topics include:

- Programming for robustness
- Structuring code
- Structuring data
- Using and creating classes and objects

Prerequisites: *MATLAB Fundamentals*



109% Average increase in competence with MATLAB after training

Based on 2010 data

MATLAB for Building Graphical User Interfaces

INTERMEDIATE

Technical Computing

This one-day course presents techniques for building graphical user interfaces (GUIs) in MATLAB. No prior GUI programming experience is required. Topics include:

- Handle Graphics® objects
- User interface controls
- Callback functions
- Graphical user interface development environment (GUIDE)
- GUI deployment

Prerequisites: *MATLAB Fundamentals*

Interfacing MATLAB with C Code

INTERMEDIATE

Image and Video Processing - Technical Computing - Test and Measurement

This one-day course covers details of interfacing MATLAB with user-written C code. Topics include:

- Source MEX-files
- Data exchange between MATLAB and MEX-files
- The MATLAB engine interface

Prerequisites: *MATLAB Fundamentals* and a basic working knowledge of the C programming language

Deploying MATLAB Based Applications – Java Edition

INTERMEDIATE

Computational Finance - Technical Computing - Test and Measurement

This one-day course focuses on generating deployable MATLAB applications using MATLAB Compiler™ and integrating MATLAB code with Java™ applications using MATLAB Builder™ JA. Topics include:

- Deployment options
- MATLAB Compiler
- Integrating MATLAB code with Java applications
- Java components with inputs and outputs
- Web deployment

Prerequisites: *MATLAB Fundamentals* and a basic working knowledge of the Java programming language

Deploying MATLAB Based Applications – .NET Edition

INTERMEDIATE

Computational Finance - Technical Computing - Test and Measurement

This one-day course focuses on generating deployable MATLAB applications using MATLAB Compiler and integrating MATLAB code with .NET applications using MATLAB Builder NE. Topics include:

- Deployment options
- MATLAB Compiler
- Integrating MATLAB code with .NET applications
- .NET components with inputs and outputs
- Web deployment

Prerequisites: *MATLAB Fundamentals* and basic working knowledge of the C# programming language

Statistical Methods in MATLAB

INTERMEDIATE

Computational Biology - Computational Finance - Technical Computing

This two-day course provides hands-on experience performing statistical data analysis with MATLAB and Statistics Toolbox™. Examples and exercises demonstrate the use of appropriate product functionality throughout the analysis process, including:

- Data import and organization
- Exploratory analysis
- Confirmatory analysis
- Simulation

Prerequisites: *MATLAB Fundamentals*

MATLAB Based Optimization Techniques

INTERMEDIATE

Computational Biology - Computational Finance - Image and Video Processing - Technical Computing

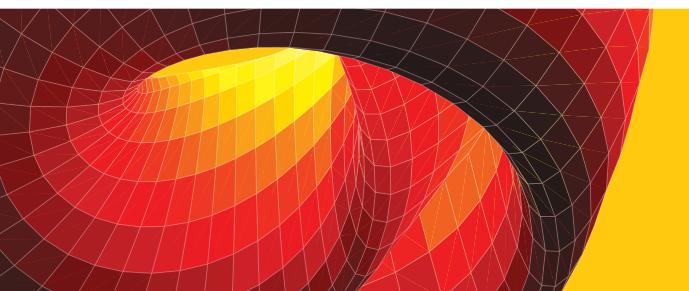
This one-day course introduces applied optimization in the MATLAB environment, focusing on using Optimization Toolbox™ and Global Optimization Toolbox. Topics include:

- Defining the problem
- Writing objective functions
- Defining constraints
- Choosing solvers and setting options
- Using global optimization methods

Prerequisites: *MATLAB Fundamentals*

“ The instructor demonstrated many features and functions in MATLAB and showed how you can solve complex problems even if you don't have a strong mathematical or computational background. Without this course, I would not have discovered all those capabilities. **”**

Dr. Svenja Caspers,
Forschungszentrum Jülich GmbH



Signal Processing with MATLAB

INTERMEDIATE

Digital Signal Processing

This two-day course shows how to analyze signals and design signal processing systems using MATLAB, Signal Processing Toolbox™, and DSP System Toolbox™. Topics include:

- Creating and analyzing signals
- Using different spectral analysis tools
- Designing and analyzing filters
- Introduction to advanced filter design
- Addressing filter implementation issues
- Processing streaming data with System objects™

Prerequisites: MATLAB Fundamentals

Image Processing with MATLAB

INTERMEDIATE

Image and Video Processing

This two-day course shows how to perform various image processing tasks using Image Processing Toolbox™. Topics include:

- Enhancing image characteristics
- Filtering an image
- Reducing the effects of noise and blurring within an image
- Extracting features and objects within an image
- Image registration
- Reconstructing images and objects

Prerequisites: MATLAB Fundamentals

Parallel Computing with MATLAB

INTERMEDIATE

Computational Biology - Computational Finance - Digital Signal Processing - Image and Video Processing - Technical Computing

This two-day course introduces tools and techniques for distributing code and writing parallel algorithms in MATLAB. The course shows how to increase both the speed and the scale of existing code using Parallel Computing Toolbox™. Topics include:

- Working with a MATLAB pool
- Speeding up computations
- Task-parallel programming
- Working with large data sets
- Data-parallel programming
- Increasing scale with multiple systems

Prerequisites: MATLAB Fundamentals

MATLAB to C with MATLAB Coder NEW

INTERMEDIATE

Communications Systems - Control Systems - Digital Signal Processing - Embedded Systems

This one-day course covers C code generation from MATLAB code using MATLAB Coder™. The focus is on making existing MATLAB code compliant, generating C code that meets optimization requirements, and integrating generated code with external modules. Topics include:

- Preparing MATLAB code for code generation
- Working with fixed-size and variable size data
- Integrating with external code
- Optimizing generated code

Prerequisites: MATLAB Fundamentals and a basic working knowledge of the C programming language

SIMULINK

Simulink for System and Algorithm Modeling

FUNDAMENTAL

Control Systems - Embedded Systems - Mechatronics

If your application involves signal processing or communications, see Signal Processing with Simulink.

This two-day 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

Prerequisites: MATLAB Fundamentals

Simulink for Aerospace System Design

FUNDAMENTAL

Control Systems - Embedded Systems - Mechatronics

Based on the *Simulink for System and Algorithm Modeling* outline, this two-day course is for aerospace engineers who are new to system and algorithm modeling and teaches attendees how to validate designs using Simulink.

Prerequisites: MATLAB Fundamentals, MATLAB Fundamentals for Aerospace Applications, or MATLAB Fundamentals for Automotive Applications

Simulink for Automotive System Design

FUNDAMENTAL

Control Systems - Embedded Systems - Mechatronics

Based on the *Simulink for System and Algorithm Modeling* outline, this two-day course is for automotive engineers who are new to system and algorithm modeling and teaches attendees how to validate designs using Simulink.

Prerequisites: MATLAB Fundamentals, MATLAB Fundamentals for Aerospace Applications, or MATLAB Fundamentals for Automotive Applications

Signal Processing with Simulink

FUNDAMENTAL

Digital Signal Processing

This three-day course covers basic modeling techniques and tools for developing Simulink block diagrams for signal processing applications. Topics include:

- Modeling single-channel and multichannel discrete dynamic systems
- Implementing sample-based and frame-based processing
- Modeling mixed-signal (hybrid) systems
- Developing custom blocks and libraries
- Modeling condition-based systems
- Performing spectral analysis with Simulink
- Integrating filter designs into Simulink
- Modeling multirate systems
- Incorporating external code
- Automating modeling tasks

Prerequisites: MATLAB Fundamentals and Signal Processing with MATLAB

Integrating Code with Simulink

INTERMEDIATE

Communication Systems - Control Systems - Digital Signal Processing - Embedded Systems - Mechatronics

This one-day course presents multiple methods for integrating C code and MATLAB code into Simulink models. Topics include:

- Writing C MEX S-functions
- Integrating MATLAB code
- Integrating C code

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling

Physical Modeling of Multidomain Systems with Simscape

INTERMEDIATE

Control Systems - Mechatronics

This one-day course discusses how to model systems in several physical domains and combine them into a multidomain system in the Simulink environment using Simscape™. Topics include:

- Creating models in various physical domains, such as electrical, mechanical, and hydraulic
- Interpreting Simscape diagrams
- Combining Simulink models and Simscape models
- Modeling energy transfer between different physical domains
- Creating user-defined Simscape components

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling

Physical Modeling of Mechanical Systems with SimMechanics

INTERMEDIATE

Control Systems - Mechatronics

This one-day course discusses how to model rigid-body mechanical systems in the Simulink environment using SimMechanics™. Topics include:

- Modeling simple multibody systems
- Combining Simulink blocks and SimMechanics blocks
- Creating reusable models of mechanical systems
- Modeling constraints (gears, wheels, etc.)

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling

MATLAB and Simulink for Control Design Acceleration

INTERMEDIATE

Control Systems - Embedded Systems - Mechatronics

This two-day course provides a general understanding of how to accelerate the design process for closed-loop control systems using MathWorks tools. Topics include:

- Control system design overview
- System modeling
- System analysis
- Control design
- Controller implementation

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling

Model Management and Verification in Simulink

ADVANCED

Control Systems - Embedded Systems - Mechatronics

This two-day course describes techniques for applying Model-Based Design in a common design workflow. It provides guidance on managing and sharing Simulink models and teaches techniques for formally verifying model behavior. Topics include:

- Implementing interface control of Simulink subsystems and models
- Managing requirements in Simulink models
- Partitioning models using Simulink subsystems, libraries, and model references
- Establishing and enforcing modeling standards
- Testing a Simulink model for accuracy and coverage
- Formally verifying model behavior
- Documenting a Simulink model

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling

Communication Systems Modeling with Simulink

ADVANCED

Communication Systems

This one-day course uses hands-on examples to demonstrate how to design end-to-end communication systems using Simulink, Communications System Toolbox™, and DSP System Toolbox. Topics include:

- Modeling a communication system
- Analyzing the bit error rate (BER) of a communication system
- Adding channel impairments
- Designing receiver algorithms

Prerequisites: MATLAB Fundamentals, Signal Processing with MATLAB, and Signal Processing with Simulink

Generating HDL Code from Simulink NEW

ADVANCED

Communications Systems - Digital Signal Processing

This two-day course focuses on generating HDL code from Simulink models including models containing MATLAB blocks and Stateflow® blocks. This course also covers generating HDL code from algorithms that use DSP System Toolbox functionality. Topics include:

- Generating HDL code
- Controlling generated code for various implementations
- Test bench generation
- Cosimulation blocks
- Optimizing generated HDL code for models

Prerequisites: Signal Processing with Simulink

23

Number of countries
where MathWorks training
is held Based on 2010 data



STATEFLOW

Stateflow for Logic-Driven System Modeling

FUNDAMENTAL

Control Systems - Embedded Systems - Mechatronics

This two-day course shows how to implement complex decision flows and finite-state machines using Stateflow. The course focuses on how to employ flow graphs, state machines, and truth tables in Simulink designs. Topics include:

- Modeling complex logic flows
- Modeling state machines
- Implementing hierarchical state machines
- Implementing multiprocessing state machines
- Using events in state charts
- Calling functions from state charts
- Implementing truth tables
- Managing the Stateflow design interface

Prerequisites: MATLAB Fundamentals and Simulink for System and Algorithm Modeling. Knowledge of C programming is helpful.

Stateflow for Automotive Applications

FUNDAMENTAL

Control Systems - Embedded Systems - Mechatronics

Based on the *Stateflow for Logic-Driven System Modeling* outline, this two-day course is for automotive engineers who wish to model and simulate event-driven and logic systems. The course offers hands-on automotive examples and exercises that apply basic techniques to realistic problems in the automotive industry.

Prerequisites: MATLAB Fundamentals (or MATLAB Fundamentals for Automotive Applications or MATLAB Fundamentals for Aerospace Applications) and Simulink for System and Algorithm Modeling (or Simulink for Automotive System Design or Simulink for Aerospace System Design)

CODE GENERATION

Simulink Coder Fundamentals

FUNDAMENTAL

Communication Systems - Control Systems - Digital Signal Processing - Embedded Systems

This one-day course provides a working introduction to code generation from Simulink models. Themes of rapid prototyping, code verification, and embedded software development are explored in the context of Model-Based Design. Topics include:

- Roles of Simulink Coder™ in Model-Based Design
- Real-time applications with xPC Target™
- Code generation
- In-the-loop verification and deployment

Prerequisites: Simulink for System and Algorithm Modeling (or Simulink for Automotive System Design or Simulink for Aerospace System Design)

Embedded Coder for Production Code Generation

ADVANCED

Communication Systems - Control Systems - Digital Signal Processing - Embedded Systems

This three-day course provides hands-on techniques in generating high-quality embedded code from Simulink models using Embedded Coder™ and customizing the generated code to meet optimization and code integration requirements. Topics include:

- Generated code module and data structure
- Code generation options and optimizations
- Integrating generated code with external code
- Customizing data characteristics
- Advanced customization techniques
- Deploying embedded code

Prerequisites: Simulink for System and Algorithm Modeling (or Simulink for Automotive System Design or Simulink for Aerospace System Design) and Model Management and Verification in Simulink

POLYSPACE PRODUCTS

Polyspace for Code Verification

ADVANCED

Embedded Systems

This two-day course is intended for software engineers and focuses on verifying that code is free of run-time errors. Topics include:

- Creating a verification project
- Reviewing and understanding verification results
- Emulating target execution environments
- Handling missing functions and data
- Managing unproven code (color-coded in orange by Polyspace® products)
- Applying MISRA® rules
- Reporting

Prerequisites: Strong knowledge of C, C++, or Ada

