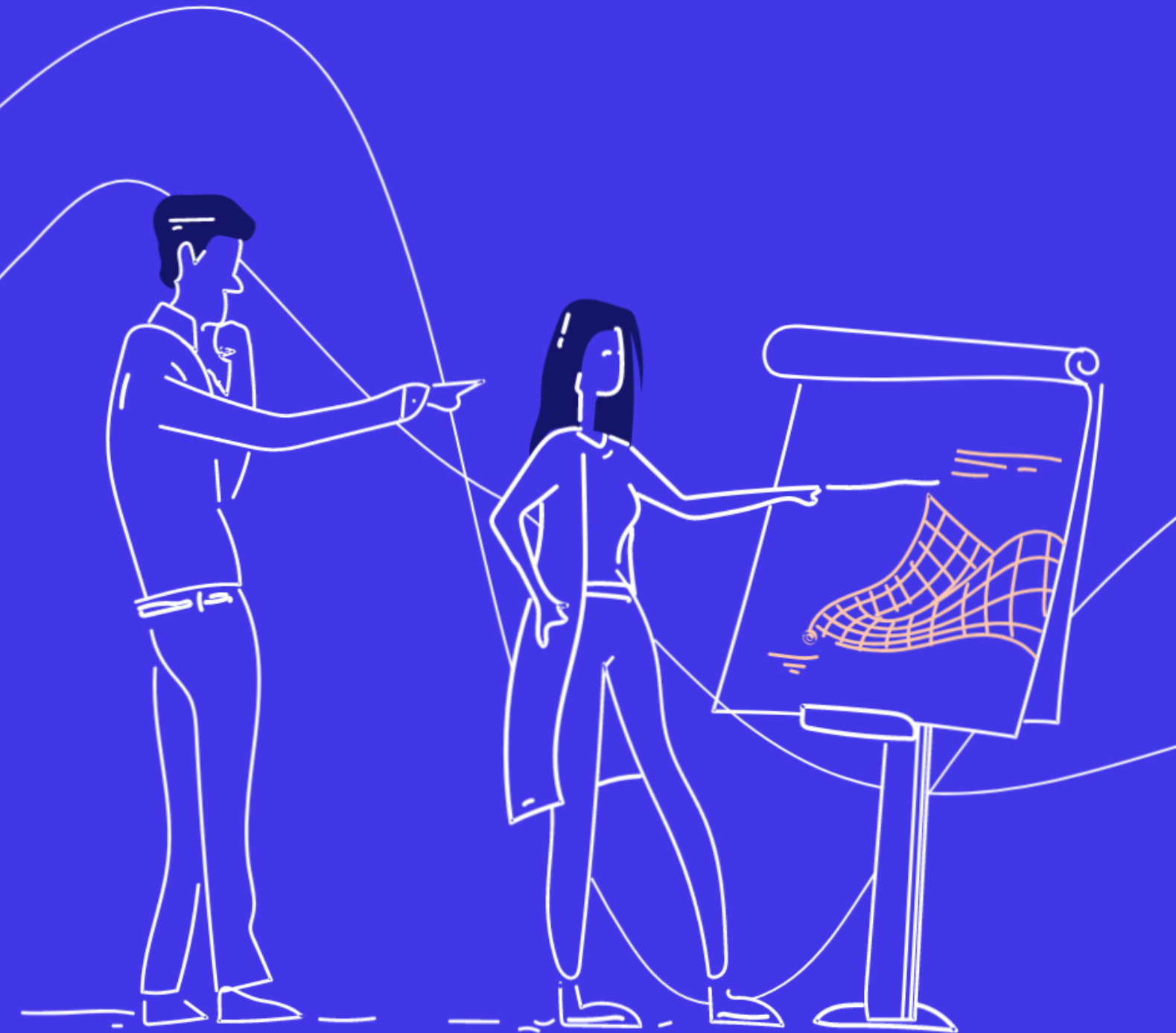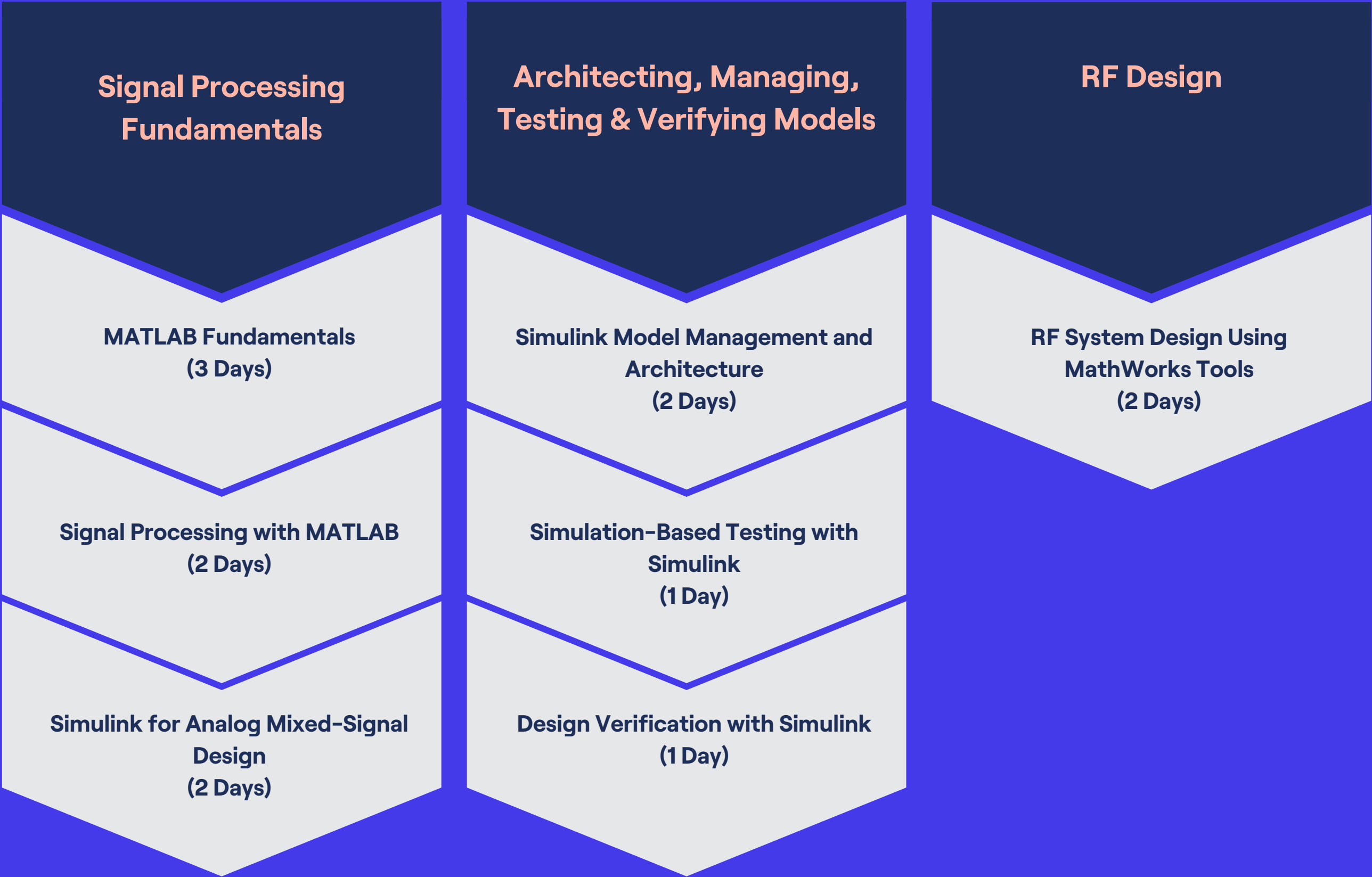# Analog Mixed Signal Curriculum

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.

Signal Processing Fundamentals

MATLAB Fundamentals
(3 Days)

Signal Processing with MATLAB
(2 Days)

Simulink for Analog Mixed-Signal Design
(2 Days)

Architecting, Managing, Testing & Verifying Models

Simulink Model Management and Architecture
(2 Days)

Simulation-Based Testing with Simulink
(1 Day)

Design Verification with Simulink
(1 Day)

RF Design

RF System Design Using MathWorks Tools
(2 Days)

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

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

2 Days

LEVEL

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

Simulink® for Analog Mixed-Signal Design

This two-day course, targeted toward new users of Simulink, uses basic modeling techniques and tools to demonstrate how to develop Simulink block diagrams for mixed-signal applications.

Prerequisites

MATLAB Fundamentals and basic knowledge of digital signal processing and mixed signal design.

Detailed course outline »

DURATION

2 Days

LEVEL

Medium

TOPICS

Day 1

- Creating and Simulating a Model
- Modeling Discrete Dynamic Systems
- Modeling Logical Constructs
- Mixed-Signal Models

Day 2

- Simulink Solvers
- Subsystems and Libraries
- Testbenches and Measurements
- Control Design Analysis

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

TOPICS

Day 1

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

Day 2

- Data Management
- Data Customization
- Modeling Standards
- Reporting

Simulation-Based Testing with Simulink

Prerequisites

This one-day course describes techniques for testing Simulink model behavior against system requirements using Simulink Test, Simulink Requirements, and Simulink Coverage. This course focuses on verification and validation, developing test cases, analyzing test results and creating repeatable groups of tests.

MATLAB Fundamentals and Simulink Fundamentals

Detailed course outline »

DURATION | LEVEL
1 day | Advanced

TOPICS

Day 1

- Verification and Validation in Model-Based Design
- Developing Test Cases
- Analyzing Test Results
- Building Test Suites

Design Verification with Simulink

This one-day course focuses on using Simulink Design Verifier to ensure that a design is devoid of possible design errors, is fully tested, and satisfies necessary requirements. Themes of detecting design errors, automatically generating tests, property proving and managing model complexity are explored throughout the course.

Prerequisites

MATLAB Fundamentals and Simulink Fundamentals

Detailed course outline »

DURATION

1 Day

LEVEL

Advanced

TOPICS

Day 1

- Understanding the Verification Workflow
- Detecting Design Errors
- Automatically Generating Tests
- Property Proving
- Managing Model Complexity

RF System Design Using MathWorks Tools

This two-day course shows how to use RF Blockset™ and RF Toolbox™ for modeling wireless front ends. You will learn when to use two different modeling paradigms to speed up the simulation of RF signals: Equivalent Baseband and Circuit Envelope. The fundamentals of the simulation techniques will be discussed, and best modeling practices will be highlighted.

Prerequisites

Signal Processing with Simulink or equivalent experience using Simulink®, and a good understanding of RF theory

Detailed course outline »

DURATION	LEVEL
2 Days	Medium

TOPICS

Day 1

- What is RF Blockset?
- Fundamentals of RF Simulation
- Importing S-Parameters and Modeling Linear Elements

Day 2

- Fundamentals of Noise Simulation
- Modeling Nonlinear Operation
- Building Tunable Networks and Developing Custom Models

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%.