

Simulink for System and Algorithm Modeling

Training Objectives

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

If your application is signal processing or communications, please refer to the *Simulink for Signal Processing* course.

Prerequisites

MATLAB Fundamentals

Products

- MATLAB
- Simulink



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Course Outline

Day 1 of 2

Creating and Simulating a Model (1.5 hrs)

Objective: Create a simple Simulink model, simulate it, and analyse the results.

- Introduction to the Simulink interface
- Potentiometer system
- System inputs and outputs
- Simulation and analysis

Modeling Programming Constructs (1.5 hrs)

Objective: Model and simulate basic programming constructs in Simulink.

- Comparisons and decision statements
- PWM conversion system
- Zero crossings
- MATLAB Function block

Modeling Discrete Systems (2.0 hrs)

Objective: Model and simulate discrete systems in Simulink.

- Discrete signals and states
- PI controller system
- Discrete transfer functions and state-space systems
- Multirate discrete systems

Modeling Continuous Systems (2.0 hrs)

Objective: Model and simulate continuous systems in Simulink.

- Continuous states
- Throttle system
- Continuous transfer functions and state-space systems
- Physical boundaries

Day 2 of 2

Solver Selection (2.0 hrs)

Objective: Select a solver that is appropriate for a given Simulink model.

- Solver behaviour
- System dynamics
- Discontinuities
- Algebraic loops

Developing Model Hierarchy (1.5 hrs)

Objective: Use subsystems to combine smaller systems into larger systems.

- Subsystems
- Bus signals
- Masks

Modeling Conditionally Executed Algorithms (1.0 hrs)

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 (1.5 hrs)

Objective: Use model referencing to combine models.

- Subsystems and model referencing
- Model referencing workflow
- Model reference simulation modes
- Model workspaces
- Model dependencies

Creating Libraries (1.0 hrs)

Objective: Use libraries to create and distribute custom blocks.

- Creating and populating libraries
- Managing library links
- Adding a library to the Simulink Library Browser