



Course Title:

Fundamentals of Code Generation for Embedded Applications

Course Purpose:

This is a one-day course that provides a working introduction to designing and testing embedded applications with Simulink Coder and Embedded Coder. Themes of simulation speedup, parameter tuning in the deployed application, structure of embedded code, code verification, and execution profiling are explored in the context of model-based design. Topics include:

- Simulation Speedup with Code Generation
- Parameter Tuning with External Mode
- Code Generation
- In-the-Loop Verification
- Code Execution Profiling

Pre- requisites:

Simulink for System and Algorithm Modeling (or Simulink for Automotive System Design or Simulink for Aerospace System Design). Knowledge of C programming language.



- ✓ One training day
- ✓ Hours: 09:00-17:00
- ✓ Total training hours: 8

Teaching method:

The course combines lectures, demonstrations and practical exercises in MATLAB, using original training books from MathWorks. The course is in Hebrew, but the training materials are in English.

עמוד מס' 1

Training Center Systematics - Contact information:

Phone number: 03-7660111 Ext: 5 **Email:** training@systematics.co.il

Website: <http://www.systematics.co.il/mathworks>



Course Objective:

Simulation Speedup with Code Generation

Objective: Speedup the simulation of your Simulink models and perform Monte Carlo simulations using the code generation features in Simulink.

- Normal simulation mode
- Accelerator mode
- Rapid Accelerator mode
- Standalone rapid simulation (Rsim)
- Simulation speed comparison and tradeoffs
- Monte Carlo simulation with Rsim target

Parameter Tuning with External Mode

Objective: Tune parameters in the embedded application using the External mode feature in Embedded Coder.

- External mode workflow
- Parameter tuning in External mode
- Running on a target emulator
- External mode considerations

Code Generation

Objective: Generate code for algorithm implementation and integrate the code with an execution harness or legacy code.

- Generating Generic Real-Time (GRT) code from a model
- Verifying GRT code
- Generating Embedded Real-Time (ERT) code from a model
- ERT code modules and entry points
- Calling model entry points
- Integrating external code

עמוד מס' 2

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In-the-Loop Verification

Objective: Verify generated code using Simulink Coder and Embedded Coder.

- Generating an S-function from a subsystem
- Software-in-the-loop (SIL) verification
- Processor-in-the-loop (PIL) verification
- Verifying a subsystem using SIL and PIL
- Verifying an entire model using SIL and PIL
- Legacy code and verification

Code Execution Profiling

Objective: Profile execution times in generated code using Embedded Coder.

- Code execution profiling for a subsystem
- Selective profiling
- Code execution profiling for an entire model
- Applications of code execution profiling

עמוד מס' 3

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