



Course Title:

Communication Systems Modeling with Simulink

Course Purpose

Using hands-on examples, this one-day course demonstrates the use of Simulink products to design common communication systems. The emphasis is on designing end-to-end communication systems using Simulink, Communications System Toolbox, and DSP System Toolbox.

Topics include:

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

Pre- requisites

MATLAB Fundamentals, MATLAB for Signal Processing, and Simulink for Signal Processing, or working experience with MATLAB, Simulink, and DSP System Toolbox



- ✓ 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:

Amplitude Modulation Using Simulink

Objective: Build an AM system to review basic concepts in Simulink.

- Building a simple AM model in Simulink
- Creating a subsystem
- Visualizing a signal in the time and frequency domains
- Working with MATLAB data
- Simulating the model from the command line

Modeling Using Communications System Toolbox

Objective: Build an end-to-end QPSK model using Communications System Toolbox and become familiar with the different visualization tools within the toolbox.

- Exploring Communications System Toolbox
- Creating a QPSK transmitter model
- Generating a random source
- Using frame-based processing
- Visualizing with scatter plots and eye diagrams
- Creating a QPSK receiver model
- Calculating error rate statistics

Communication Systems Analysis

Objective: Analyze the BER performance of an end-to-end communication system by writing a MATLAB script and using BERTool.

- Computing the BER curve
- Automating performance analysis: scripts
- Adding channel coding
- Using BERTool for performance analysis

Channel Impairments and Receiver Algorithms

Objective: Add channel impairments and recovery blocks to test receiver performance.

- Adding phase and frequency offset
- Correcting phase and frequency using DQPSK
- Adding timing offset
- Correcting for timing offset
- Modeling multi-path channel impairments
- Using MATLAB code in the model for equalization

Appendix B: Case Studies

Objective: Modeling a WiMAX system core.

- Develop a model for an OFDM modulator and demodulator.

עמוד מס' 2

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