ME2300

Digital Signal Processing Courseware

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~Complete Resources for Lecturers~

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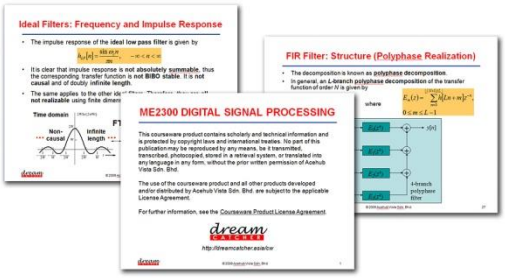
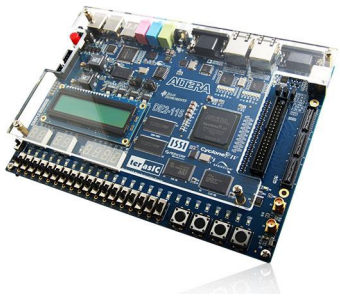
Teaching slides

- Editable Microsoft® PowerPoint® slides
- Covers 45 hours of teaching



Training kit

- Altera DE2-115 board & EDA software
- Lab sheets & model answers
- Problem-based assignments
- Covers 30 hours of labs



Target university subject	Target year of study	Prerequisite(s)
Digital Signal Processing	3rd or final year undergraduate	Signals and Systems

The ME2300 serves as a ready-to-teach package in the areas of digital signal processing (DSP) design, simulation, and hardware implementation using an FPGA platform. This is a lecturer resource consisting of teaching slides, training kits, lab sheets, and problem-based assignments.

Designed to impart knowledge in

- Time and frequency domain representations and signal analysis
- Z-Transform and filtering concepts
- FIR and IIR digital filter designs
- Efficient FIR and IIR digital filter implementations
- FFT applications
- System-level designs of real-time signal processing systems
- Software-hardware co-simulation and verification
- The MathWorks MATLAB®, Simulink®, and Altera DSP Builder usage
- Measurement instruments usage

Benefits of the ME2300 courseware

- Lab sheets are specially designed to allow students to learn a complete DSP design cycle: starting with design and simulation using software tools to final implementation onto an FPGA-based hardware platform—the conventional approach for this subject does not include hardware implementation.
- Students are given exposure on the use of a mixed signal oscilloscope for debugging and results validation: this provides a better understanding of analog and digital signals.
- Practical DSP examples with sample design files are included, providing you with a useful reference to speed up the development of various applications.

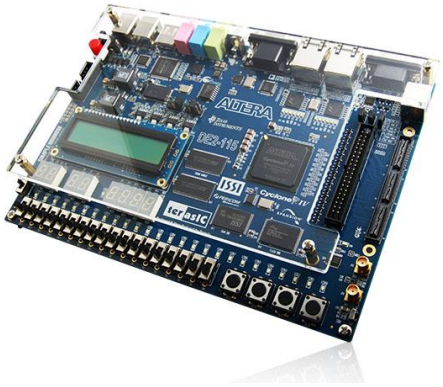
Teaching Slides

More than 600 editable Microsoft PowerPoint teaching slides, covering 45 hours of teaching for one full semester are provided. The slides cover the following topics:

- Signal Characteristics and Digitization
- Frequency Domain Analysis
- Z-Transform and Filtering Concepts
- Digital Filter Structures and Characteristics
- FIR Filter Design
- IIR Filter Design
- DSP Implementation Using FPGA

Training Kit

Altera DE2-115 board



The courseware is designed to work with the Altera DE2-115 development and education board.

The Cyclone EP4CE115 device equipped on the DE2-115 features 114,480 logic elements (LEs), the largest offered in the Cyclone IV E series, up to 3.9-Mbits of RAM, and 266 multipliers.
The DE2-115 adopts similar features from the earlier DE2 series primarily the DE2-70, as well as additional interfaces to support mainstream protocols including Gigabit Ethernet (GbE). A High-Speed Mezzanine Card (HSMC) connector is provided to support additional functionality and connectivity via HSMC daughter cards and cables.

Note: The manufacturer warrants its products against defects in materials and workmanship for a period of 90 days from the date of purchase.

The MathWorks software

The courseware uses the The MathWorks MATLAB, Simulink, Signal Processing Toolbox, and Signal Processing Blockset, to be purchased separately, for DSP design modeling and simulation.

Altera EDA software

The Altera DSP Builder software is used to generate VHDL files from Simulink Model Files using Altera's Simulink-to-FPGA synthesis technology. The VHDL files are then implemented into the DE2 board FPGA hardware using the Altera Quartus II Subscription Edition software.

You join the join the Intel® FPGA Academic Program to get free teaching and research resources exclusively for faculty and staff. Please refer to the ME2300 Quick Start Guide for details.

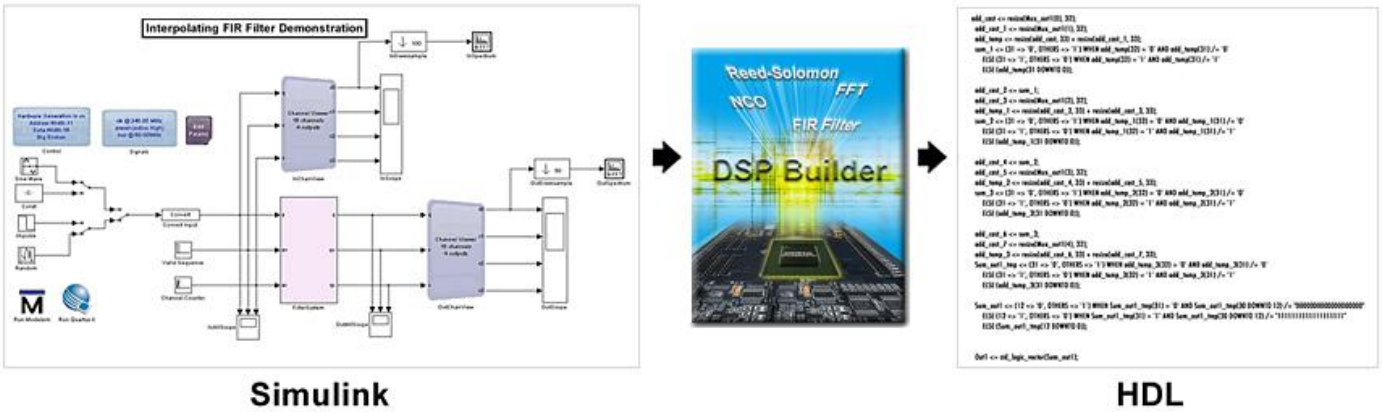


Image source: www.altera.com

Note: *A PC with Windows® XP, Windows® Vista or Windows® 7 is required to run The MathWorks and Altera software.*

Accessories

The following accessories are provided with the training kit.

Item	Quantity
Headphone	1

Lab sheets

The training kit includes 10 lab sheets in editable Microsoft Word format. Each lab requires 3 hours to complete. Model answers are provided with all lab sheets. The required training kit hardware and recommended instrument for the labs are listed below.

Lab Sheet	Hardware Kit	Required The Mathworks Software		Optional Item
	Altera DE2-115 board, Quartus II	DSP Builder software	MATLAB, Simulink, Signal Processing Toolbox, & Signal Processing Blockset software	Mixed Signal Oscilloscope
Introduction to Signal Analysis			√	
Fourier Transform and Windowing Techniques			√	
Z-Transform and Filtering Concepts			√	
Finite Impulse Response Filter Design			√	
Infinite Impulse Response Filter Design			√	
Design Flow with MATLAB, Simulink, and DSP Builder	√	√	√	
Real-Time DSP	√	√	√	√
FIR Filter Implementation	√	√	√	√
Digital Signal Generator	√	√	√	√
Double-Sideband Demodulator	√	√	√	

Problem-based assignments

The problem-based assignments below allow students to enhance their problem-solving skills.

- Chirp Signal Generator
- Real-Time Audio Processing

Instruments

The recommended instrument and accessory from Keysight Technologies, to be purchased separately, are listed below.

Instrument / Accessory	Model[1]
Mixed Signal Oscilloscope	MSOX3012A Oscilloscope: 100MHz, 2 analog & 16 digital channels[2]

[1] The instruments and accessory shown are recommended, but may be replaced by other models with equivalent performance.
- 100 MHz, 2 analog & 16 digital channels

[2] The MSOX3012A is also the recommended model for ME1110, ME2000, ME2100 and ME2200.

Ordering Information

Description	Package	Product Number
Teaching Slides	1 user license	ME2300-100
Training Kit (includes DE2-115)	1 unit	ME2300-220
Teaching Slides + Training Kit	1 user license + 1 unit	ME2300-320
The MathWorks software	MATLAB, Simulink, Signal Processing Toolbox, and Signal Processing Blockset	Purchase separately from The MathWorks or its distributor
Instruments	where applicable	Purchase separately from Keysight or its distributor

Training courses related to subject matter are available on request. Visit dreamcatcher.asia for details.

For more information or enquiries:

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