EN1014 Electronic Engineering

Introduction - Digital Section

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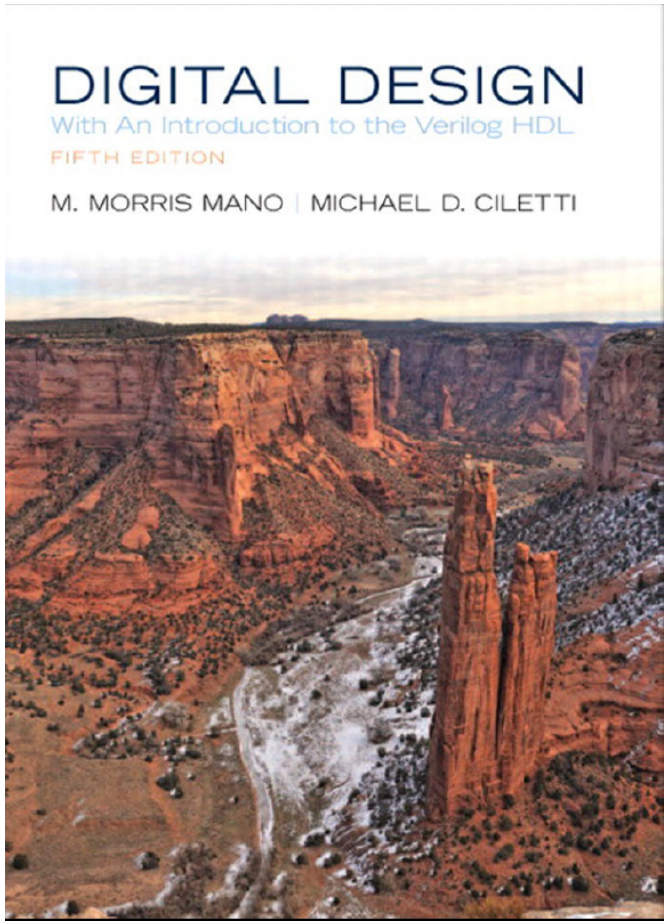
Learning Outcome and Course Contents - Digital Section

- Learning Outcome: At the end of the module the student will be able to design simple combinational and sequential logic circuits.
- Course Contents:

Simple Combinational and Sequential Logic Circuits [10h]
Boolean algebra, Karnaugh maps, Half adder, Full adder, Ripple-carry adder, Multipliers, Comparators, Multiplexers and demultiplexers, Encoders and decoders, Latches and flip-flops, Mealy and Moor machines, Sequence detectors.

Course Text



Reference: M. M. Mano and M. D. Ciletti, *Digital Design: With an Introduction to the Verilog HDL*, 5th ed. (International Economy Edition), Prentice Hall, 2012

Welcome to Electronic Engineering

- Main subfields:
  - Analog electronics
  - Digital electronics
  - Power electronics
  - Radio-frequency electronics.

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- A modern complex electronic system is:
  - A combination of all the four main subfields,
  - With analog and digital (mixed) signal processing.

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  - Personal computers
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- Digital systems manipulate discrete elements of information or digital signals.
- Digital signals
  - are emerged from the nature of the data, e.g. oil price at 6 am on each day
  - can be generated from an analog signal through A/D conversion, e.g. digitized audio signal.

Digital Systems and Digital Signals *cont'd*

- The signals in most modern-day digital systems use just two discrete values; therefore, called binary.
- A binary digit, called bit, has two values: 0 and 1.
  - can be implemented using transistors, which have two states: on and off.

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- Why should we learn digital design?

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  - Combinational circuits (memoryless systems)
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  - Hardware description languages (HDLs), e.g.,
    - Verilog
    - VHDL
    - System Verilog,
  - Register transfer level (RTL) abstraction.

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- In this module, we learn the fundamentals of combinational and synchronous sequential circuit design.