אוניברסיטת בר-אילן

Update date: 10.01.14

# Digital VLSI Circuits and Systems

## 83-612

## Shmuel wimer

**Course format: Lectures and Training**

First Semester 2013 Weekly **hours**: 2 lecture + 1 training

1) **Course objectives**:

Understand and acquire knowledge in designing modern digital VLSI circuits and systems. Learning the theory and modeling of the basic factors affecting the design: performance, power, area and cost. Get hands on algorithms aiding the VLSI design.

2) **Course format**:

Frontal lectures – in the classroom.
Frontal training – in the classroom.

3) **Course content**:

| Week | Topic | Reading |
|---|---|---|
| 1 | Scaling, transistor scaling, device enhancements, interconnect scaling, interconnect enhancement. | |
| 2 | Interconnect design, capacitance, resistance, inductance. | |
| 3 | Signal propagation analysis, lumped and distributed models, closed form solutions, Elmore delay, Penfield-Rubinstein algorithm. | |
| 4 | Power dissipation, transient power, static power, dynamic power. | |
| 5 | Interconnect coupling noise, active and passive device noise, switching activity, coupling. | |
| 6 | Global signaling, interconnect topology optimization, sizing, spacing, tapering, repeaters. | |
| 7-8 | Power generation, voltage regulation, power converters. Power distribution, supply noise, grid, power planes, decoupling, power noise reduction. | |
| 9 | Synchronous design, self-timing, GALS, synchronizers. | |
| 10-11 | Clock generation, PLL, DLL, clock distribution, clock gating. | |
| 12 | Adders design | |
| 13 | Multipliers design | |
| 14 | Memories design, SRAM, DRAM | |

4) **Prerequisites:**

Digital Integrated Circuits 83-313

5) **Course requirements:**

Presence in lectures, contribution to the discussion, biweekly homework assignments.

6) **Grading:**

Final exam: 75% ; Homework exercises: 25% ; Pass grade (60) in the final exam is mandatory.

7) **Textbooks and supplementary reading:**

E. Salman and E. Friedman, High Performance Integrated Circuit Design, McGraw Hill.
N.H.E Weste and D. Harris, CMOS VLSI Design, 3rd Edition, Pearson.
All lectures are on-line available.