



EC 535

Digital VLSI Design

S'2012

Course Outline

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| Instructor: | Prof. Hazem H. Ali |
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| Objective: | The objective of this course is to achieve an understanding CMOS Digital Design circuits and Layout |
| Text: | "CMOS VLSI DESIGN", Neil H.E Weste and David Harris, Addison Wisley Press, 2005 |
| References: | 1. Lecture Notes. 2. Principle of VLSI Design, Neil H.E. Weste |
| Online Resources | http://www.ac.tut.fi/aci/courses/76527/ |
| Grading: | 7th Week (30%): ✓ Exam I: 20 % ✓ Assignments: 10 % Project 30% Final Exam (40%) |

| Week of | | E V E N T | |
|---------|------------------------|-------------------|---|
| 1 | 20 th Feb | Lecture | Introduction to MOS transistor |
| | | Tutorial | Introduction to Microwind_1 |
| 2 | 27 th Feb | Lecture | Basic Gates Design: Inverter, NAND, Combinational Logic and NOR Gates |
| | | Tutorial | Basic Inverter and NAND design using Microwind |
| 3 | 5 th March | Lecture | Digital design logic using Stick Diagram-Compound Gates-Pass Transistors and Transmission Gates-Tristates |
| | | Tutorial | From Stick Diagram to Layout |
| 4 | 12 th March | Lecture | MUX design -Latches and flip flop Design-Top level Interface-Block Diagram Circuit and Physical Design |
| | | Tutorial | MUX, Latches and flip flops using microwind |
| 5 | 19 th March | Lecture | MOS Transistor Theory_1 : Introduction Ideal I-V Characteristics C-V Characteristics Non Ideal I-V Characteristics |
| | | Tutorial | Problem Sets 1 |
| 6 | 26 th March | Lecture | MOS Transistor Theory_2: DC Transfer Characteristics |
| | | Tutorial | Microwind Quiz |
| 7 | 2 nd April | Lecture | Exam I |
| | | Tutorial | Revision |
| 8 | 9 th April | Lecture | Circuit Characterization and Performance Estimation_1: Introduction – Delay Estimation- Logical Effort and transistor sizing-Power Dissipation |
| | | Tutorial | Problem Sets 2 |
| 9 | 16 th April | Lecture | Circuit Characterization and Performance Estimation_2: Interconnect |
| | | Tutorial | Delay in logic circuit using Microwind and DSCH |
| 10 | 23 th April | Lecture | Combinational Circuit Design: Dynamic Circuits – Pass Transistor Circuits Sequential Circuit Design_1: Introduction- Sequencing Static Circuit |
| | | Tutorial | Problem Sets 3 |
| 11 | 30 th May | Lecture | Sequential Circuit Design_2: Circuit Design of Latches and Flip Flops [Conventional CMOS circuits] |
| | | Tutorial | Problem sets 4 |
| 12 | 7 th May | Lecture | Testing and Verifications |
| | | Tutorial | Projects Discussion |
| 13 | 14 th May | Lecture | VHDL |
| | | Tutorial | Introduction to VHDL |
| 14 | 21 st May | Lecture | Revision |
| | | Tutorial | |
| 15 | 28 th May | Final Exam | |

Good Luck