

1. Course Number and Course Title

COE 428 – VLSI Design

2. Credits Hours

3-0-3

3. Prerequisites and/or Co-Requisites:

Prerequisites COE221 (Digital Design) and ELE241 (Electronics I)

4. Name and Contact Information of Instructor:

Dr. Assim Sagahyoon

5. Course Description (catalog)

Covers CMOS technology, layout rules and techniques, CMOS logic and circuit design, circuit characterization and performance estimation, and design methodologies and tools.

6. Textbook and other Supplemental Material:

Integrated Circuit Design by N. Weste and D. Harris; 4rd Ed., PEARSON, 2011

7. Learning Outcomes:

Upon completion of the course, students will be able to:

1. Demonstrate an understanding of CMOS circuit design techniques
2. Examine the different components of a typical integrated circuit design flow
3. Contrast the characteristics of circuit families (Static CMOS, Pseudo-NMOS, Dynamic, etc.)
4. Design Combinational Circuits using CMOS
5. Design sequencing elements (flip-flops and latches) using CMOS
6. Calculate delays using RC Models
7. Compare design options using *Logical Effort* technique
8. Estimate Power Consumption in CMOS circuits
9. Use CAD tools to perform the design and layout of simple circuits

8. Teaching and Learning Methodologies:

Methods include lectures; problem and project based learning methods (homework, simulation-based projects) and class discussions.

9. Course Topics and Schedule:

Topic	Weeks
CMOS logic	2
MOS C-V characteristics	1
DC transfer characteristics	1
Delay estimation	1
Interconnects	2
Circuit families	2
Introduction to Cadence EDA Tools	1
Combinational and sequential circuit design	2

Datapath Circuits	2
Review & Evaluation	2
Total:	16