

EE 134 - Digital CMOS Integrated Circuit Layout and Design

TECHNICAL ELECTIVE

4 units, 3 hours Lecture - 3 hours Laboratory  
 Prerequisites: EE 100a,b; EE120a,b; EE133

This course covers CMOS integrated circuit design, layout and verification using the CADENCE CAD tools. Topics covered are CMOS fabrication and layout, digital models, inverters, static logic gates, transmission-gates, flip-flops, dynamic logic gates, and memory circuits.

Item	OUTCOME-RELATED LEARNING OBJECTIVES	OUTCOMES													
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Understand the device model for a modern short-channel FET	3	1	3		3						3			
3	Understand the parasitic diodes and capacitors of an inverter.	3		3		3									
2	Ability to layout, DRC, and LVS a CMOS digital IC.	3		3	3	3						3			
4	Calculate delay times through inverters and logic gates.	3		3		2									
5	Size a chain of inverters to drive a large capacitive load	3		3		3									
6	Design static CMOS logic gates	3		3		3									
7	Understand CMOS transmission gates	3		3		3									
8	Understand CMOS transmission gate latches and registers	3		3											
8															
9															
10															
<b>SUBTOTALS</b>		<b>24</b>	<b>1</b>	<b>24</b>	<b>3</b>	<b>20</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>0</b>	<b>0</b>

**OBJECTIVE ADDRESSES OUTCOME: SLIGHTLY - 1, MODERATELY - 2, SUBSTANTIALLY - 3**

- Outcome 1: Ability to apply knowledge of mathematics, science, and engineering.
- Outcome 2: Ability to design and conduct experiments, as well as analyze and interpret data.
- Outcome 3: Ability to design a system, component, or process to meet desired needs.
- Outcome 4: Ability to function on multidisciplinary teams.
- Outcome 5: Ability to identify, formulate, and solve engineering problems.
- Outcome 6: Understanding of professional and ethical responsibility.
- Outcome 7: Ability to communicate effectively.
- Outcome 8: Broad education necessary to understand the impact of engineering solutions in a global and societal context.
- Outcome 9: Recognition of the need for and an ability to engage in lifelong learning.
- Outcome 10: Knowledge of contemporary issues.
- Outcome 11: Ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- Outcome 12: *Optional - as determined by program.*
- Outcome 13: *Optional - as determined by program.*
- Outcome 14: *Optional - as determined by program.*

