

School of Engineering and Computer Science
ECE 478: Introduction to CMOS Integrated Circuit Design
Master Syllabus

Catalog Data:	ECE 478: Introduction to CMOS Integrated Circuit Design; 3 credits CMOS integrated circuit design, including MOS transistors, combinational and sequential circuit design and layout, gate and interconnect delay modeling, power, and clock distribution, datapath and memory design, IC testing, and design-for-test.
Class Schedule:	Three lecture hours per week, for one semester.
Laboratory Schedule:	None
Prerequisites by Course:	ECE 214 and ECE 325
Prerequisites by Topic:	<ol style="list-style-type: none"> 1. Knowledge of basic circuit theory including DC circuits and transient response. 2. Knowledge of MOS transistor theory and applications. 3. Knowledge of digital logic design, including combinational and sequential circuits.
Typical Text:	Weste, N., Harris, D., <i>CMOS VLSI Design, 4/e</i> , Addison Wesley 2011, ISBN: 978-0-321-54774-3
Course Coordinator:	Dr. John Lynch
Course Objectives:	<p>Students will:</p> <ol style="list-style-type: none"> 1. Use MOS transistor and delay models to analyze digital circuit timing and power consumption 2. Use CMOS principles to design digital logic circuits 3. Understand IC testing, and trends in IC processing and scaling
Topics Covered:	<ol style="list-style-type: none"> 1. MOS transistor theory 2. CMOS inverter circuits 3. CMOS manufacturing technology 4. Delay and logical effort 5. Power dissipation 6. Interconnect modeling 7. Variability and reliability 8. Combinational logic circuits 9. Sequential logic circuits 10. Metastability and synchronization 11. Datapath arithmetic circuits 12. IC Power and clock distribution 13. IC testing and design-for-test
Lab Experiments and Activities:	n/a

Course Outcomes:	Students will be able to:		
	Assessed for Program Outcomes	1.c. Use appropriate MOS transistor and interconnect models to formulate solutions for digital circuits. 2.b. Apply the design process to satisfy project requirements for CMOS circuit implementation.	
	Other	2.a. Define engineering problems from specified needs for digital IC implementation	
Relationship of Course to Program:	Meets: Educational Objectives <u>1, 2</u> Program Outcomes <u>1, 2</u>		
Prepared by:	Dr. John Lynch	Date:	Oct. 1, 2021
Approved by CAC:			