

Course Description					
Name	Code	Semester	T+A Hour	Credit	ECTS
DIGITAL MİCROELEKTRONİK DESIGN	EEE4112633	Fall Semester	3+0	3	6
Prerequisites Courses	ELEKTRONİK I				
Recommended Elective Courses	ELECTRONICS 1				
Language of Instruction	English				
Course Level	First Cycle (Bachelor's Degree)				
Course Type	Elective				
Course Coordinator	Assist.Prof. Mustafa AKTAN				
Name of Lecturer(s)	Assist.Prof. Mustafa AKTAN				
Assistant(s)					
Aim	At the end of this class, students will understand the impact of digital circuit design choices on speed, power, and cost. In addition, students will be able to make appropriate trade-offs, using back-of-the-envelope circuit analysis. They will be familiar with options for designing interconnect, data-paths, and specialpurpose digital circuits. They will be able to apply modern design methods and use industry-standard tools. They will be able to design a digital integrated circuit from specification, verify their design, and provide oral and written reports on their work.				
Course Content	This course contains; Course Overview – Introduction,Circuits and Layout,CMOS transistor theory,DC response of CMOS gates,Transient response of CMOS gates,Logical effort theory,Logical effort theory,Power analysis of CMOS circuits,CMOS Sequential Circuits,Interconnect analysis and engineering,Adder architectures and design,Standard cell/gate design,Datapaths,Other circuit families.				
Course Learning Outcomes			Teaching Methods	Assessment Methods	
1. Circuits and layout2. CMOS transistor theory, non-ideal transistor characteristics3. DC and transient response of digital circuits4. Logical effort theory5. Power analysis of digital circuits6. Combinational circuit elements design in CMOS technology7. Sequential circuit elements design in CMOS technology8. Interconnects9. Adder/subtractor circuits10. Datapaths			17, 2, 21, 9	A, E, F	
Teaching Methods	17: Experimental Technique, 2: Project Based Learning Model, 21: Simulation Technique, 9: Lecture Method				
Assessment Methods	A: Traditional Written Exam, E: Homework, F: Project Task				
Lecture Schedule					
Sequenc e	Topics	Preliminary Preparation			
1	Course Overview – Introduction	Lecture Notes, Related Book Chapter			
2	Circuits and Layout	Lecture Notes, Related Book Chapter			
3	CMOS transistor theory	Lecture Notes, Related Book Chapter			
4	DC response of CMOS gates	Lecture Notes, Related Book Chapter			
5	Transient response of CMOS gates	Lecture Notes, Related Book Chapter			
6	Logical effort theory	Lecture Notes, Related Book Chapter			
7	Logical effort theory	Lecture Notes, Related Book Chapter			
8	Power analysis of CMOS circuits	Lecture Notes, Related Book Chapter			
9	CMOS Sequential Circuits	Lecture Notes, Related Book Chapter			
10	Interconnect analysis and engineering	Lecture Notes, Related Book Chapter			
11	Adder architectures and design	Lecture Notes, Related Book Chapter			
12	Standard cell/gate design	Lecture Notes, Related Book Chapter			
13	Datapaths	Lecture Notes, Related Book Chapter			
14	Other circuit families	Lecture Notes, Related Book Chapter			
Evaluation Methods		Weight(%)			
Midterm Exam		30			
General Exam		70			

Resources
Textbook: Integrated Circuit Design, 4th Ed., (Weste& Harris, Addison Wesley, 2011) Tools: Cadence Virtuoso schematic/ layout editor, Cadence ADE, Mentor Graphics Calibre DRC and LVS and PEX