

Department of Computer Engineering			
Digital Electronic Circuits (66332)			
Total Credits		3	
major compulsory			
Prerequisites		P1 : Electronic Circuits II (63313) P2 : Digital Circuit Design II (66321)	
Course Contents			
Topics covered includes: digital families (RTL,DTL,TTL,ECL,I2L,CMOS), CMOS properties, OP-AMPS circuits and their interfacing, Analogue-to-Digital and Digital-to-Analogue conversions, sensor circuits (optical and ultrasonic), Regulated Power Supplies, Driver Circuits and power demanding (Relays, H Bridges, High Current Drivers, Power Electronics SCRs, Triads, and SGT)			
Intended Learning Outcomes (ILO's)		Student Outcomes (SO's)	Contribution
1	Acquire knowledge of digital families: CMOS, TTL, I2L and old technologies: RTL, DTL and ECL	A	20 %
2	Analyze and design basic digital circuits using CMOS technology: Timing, Capacitance, Noise Margins and Basic Layout	E	20 %
3	Analyze and design practical circuits using: OP-AMPS, Sensors (e.g. Temperature, Ultrasonic), Relays, Solid State relays, H Bridges, High Current Drivers and Power Electronics SCRs	K	30 %
4	Analyze and interface analogue to digital and digital to analogue.	C	20 %
5	Analyze and design regulated power supplies for digital circuits	C	10 %
Textbook and/ or References			
Analysis and Design of Digital Integrated Circuits by Hodges and Jacksons., Electronic Devices and Circuits by Hassul and Zimmerman., Digital Design by Morris Mano,Digital Electronics: A Modern Approach by John Uffenbeck			
Assessment Criteria		Percent (%)	
First Exam		23 %	
Second Exam		22 %	
Homeworks		5 %	
Projects		10 %	
Final Exam		40 %	
Course Plan			
Week	Topic		
1- 3	Bipolar Families (Introduction (digital logic families, fan-out, power, propagation delay and noise margin), Old logic families: (RTL, DTL), TTL, DTL and I2L)		
4	NMOS Transistor Analysis (The NMOS transistor operation , Threshold Voltage , NMOS Transistor Capacitance, I-V Characteristics)		
5- 6	CMOS Inverter and gates (CMOS Transistor Components , Noise Margins, Voltage Transfer Characteristics, Switching Times, Spice Simulation, NAND and NOR gates, Inverter Layout, Transistor Sizing)		
6	First exam		
7- 8	OP-AMPs from A Practical Point of View (Review of OP-AMPs, Designing OP-AMP		

	amplifier and circuit conditioning for Digital Interfacing, Practical Analog Output Signals: Constant Current Sources, Comparators)
9- 10	Sensors and Transducers (LEDs and Laser Diodes, Opto-diodes and Opto-transistors, Ultrasonic, Design Examples using Optical and Ultrasonic Transducer)
11- 12	Driver Circuits and Interfacing Power Demanding (DC Motor and Speed Control , H Bride, Relays and Solid State Relays, SCRs, Triacs, SGT and Power Electronics, Driver ICs)
12	Second Exam
13- 14	Analogue to Digital and Digital to Analogue Conversion (A to D Conversion , D to A Conversion)
15- 16	Regulated Power Supplies (Linear Power Supplies, Switch Mode Power Supplies, Constant and Variable Power Supplies)
16	Final exam