FUTURE UNIVERSITY IN EGYPT جامعة المستقبل

Faculty of Engineering & Technology

Digital Systems and Computer Organization

Information :

Course Code :	CMP 334	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Department of Electrical Engineering

Instructor Information :

Title	Name	Office hours
Professor	Khaled Mohamed Amin Mohamed Abdelmonem Zayed	
Assistant Lecturer	Mohamed Essam Abd El Aziz Abd El Aal	
Teaching Assistant	Ahmed Mahmoud Mohamed Mahmoud Hegazy	1
Teaching Assistant	Samar Abdelmohaimen Mohamed Soliman	
Teaching Assistant	Hamdy Sherif Hamdy Amin Elshehaby	

Area Of Study :

Prepare students to analyze, design and implement digital circuits.
Develop studentsôknowledge about the design principles of digital system and its applications in the computer system.
Develop studentsôknowledge about the fundamental principles of computer architecture used to design microprocessors and microcomputers.
Provide students with the basic concepts of instruction set architecture and related design principles.

Description :

Sequential logic: state table and transition diagram, design of digital systems, incompletely specified states, counters, shift registers, miscellaneous topics: adders, subtractors, decoders, coders, multiplexer/demultiplexer, memories (ROM, EPROM, EEPROM, FLASH, RAM). Description of a hypothetical computer system, The CPU main memory, I/O subsystem and all related components. The architecture of the Intel 80x86 based microprocessors, Linkers, library managers and debugging tool. Macro assembler programming techniques involving building, Incorporating and maintaining libraries, and using assembler pseudo-ops and directives. Debugging and testing techniques, interfacing a high level language with an assembly language, Chip level programming of microprocessor type systems, Topics covered include I/O ports, I/O devices and controllers, DMA channels, priority.

Course outcomes :

a.Knowledge and Understanding: :

1 -	Explain the principles, theories, techniques and applications of digital circuits.
2 -	Explain different techniques of the Register Transfer Language (RTL).
3 -	Explain the principles, techniques and applications of computer organization, microprocessors and microcontrollers.
4 -	Explain the complete design of the basic computer.
5 -	Describe Intel 80x86 based microprocessors including the assembly language.

b.Intellectual Skills: :	
1 -	Apply mathematical background for analysis and design of digital circuits.
2 -	Use software tools to design digital circuits.
3 -	Create different micro-operations based on the RTL for the instruction set of the basic computer.
4 -	Design the complete basic computer.
5 -	Establish an assignment report on the selected topics of the course.
c.Professional and Practical Skills: :	
1 -	Apply theories and techniques of mathematics to solve digital circuit problem.
2 -	Build the appropriate digital circuits to design the required digital system.
3 -	Develop the design and implementation of digital circuits using software tools.
4 -	Argue datasheets and perform appropriate specifications for required digital circuits.
d.General and Transferable Skills: :	
1 -	Collaborate effectively within multidisciplinary team
2 -	Communicate effectively.
3 -	Effectively manage tasks, time, and resources.
4 -	Search for information and engage in life-long self-learning discipline.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Memory and Programmable integrated circuits: Memory components and organization, Different types of the random âaccess memory, Memory decoding, write and read Operations, Different types of the readâ only memory, Programmable integrated circuits.	6	4	10
Register Transfer Language (RTL): Register transfer and micro-operations, Bus and memory transfers, Arithmetic micro-operations, Logic micro-operations, Shift micro-operations, design of the arithmetic logic shift unit.	6	4	10
Basic Computer Organization and Design: Instruction codes, Computer registers and instructions, Timing and control, Instruction cycle, Instruction types: Memory-reference instructions, Register-reference instructions, Input/output instructions and interrupt.	9	6	15
Complete Computer Description and design of basic computer: Design of control unit, Design of accumulator, Control memory, Address sequencing, mapping of instruction and addressing modes, Input-Output Organization: I/O Bus and interface modules. I/O versus Memory Bus. Priority Interrupt. Direct Memory Access (DMA).	9	6	15
The architecture of the Intel 80x86 based microprocessors including the assembly language.	9	6	15
Digital circuits and Digital Components: Combinational Circuits, sequential circuits, state table and transition diagram, different registers and universal shift register, ripple and synchronous counters, miscellaneous topics: adders, subtractors, decoders, coders, multiplexer/demultiplexer. Translation Look-aside Buffer (TLB). Cache Memory: Addressing, Mapping, Block size, Replacement.	6	4	10

Teaching And Learning Methodologies :
Lectures
Tutorials

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignments/project	15.00	6	to assess the skills of problem solving, understanding of related topics
Attendance/Performance	5.00	14	to asses the performance of the students through the overall
Final-term examination	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied.
Mid-Term 1	15.00	7	to assess the skills of problem solving, understanding of related topics
Mid-Term 2	15.00	11	to assess the skills of problem solving, understanding of related topics
Quiz 1	5.00	5	to assess the skills of problem solving, understanding of related topics
Quiz 2	5.00	9	to assess the skills of problem solving, understanding of related topics

Recommended books :
M. Morris Mano, and Michael D. Ciletti; ñDigital Design with an Introduction to the Verilog HDLò, 5th Edition; Pearson; 2013.