



**Computer Engineering Dept.  
College of Engineering and Technology,  
Arab Academy for Science, Technology & Maritime Transport  
Abu Qir, Alexandria,  
Egypt**

## ***CC 216 (Winter 2004) Syllabus***

Instructor: Dr. Ashraf Zaher  
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TA: Eng. Marwa

Subject: Digital Logic Design (3 credits)  
Prerequisites: CC 111 (Introduction to Computers)

Lecture: T 12:30 PM - 02:10 PM in Room 200  
Tutorial: T 02:30 PM - 04:10 PM in Room 200  
Lab: T 08:30 AM - 10:10 AM in Room 441  
Office Hours: T 10:30 AM - 12:10 PM in Room 200 or by appointment (email me first!)

Textbook: Digital Fundamentals  
6<sup>th</sup> Edition, Thomas L. Floyd  
Prentice-Hall, 2001 - ISBN: 0-13-573478-9

Course website: [www.????.???](http://www.????.???)

### □ **Course objectives:**

1. Presenting the basic concepts used in the design and analysis of digital systems.
2. Providing various methods and techniques suitable for a variety of digital design applications.
3. Guiding students in using hardware and ICs technology in realizing and troubleshooting digital systems.

### □ **Course contents (as per AAST undergraduate catalog):**

Number Systems, Binary arithmetic and codes, Logic gates, Boolean algebra and logic simplifications, Design and realization of combinational circuits, Functions of combinational logic, Flip Flops, Analysis and realization of counters, analysis and realization of shift registers, Computer-aided engineering (schematic entry).

### □ **Assessment scheme:**

1 <sup>st</sup> Mid-Term Exam:	30%	(week #7)
2 <sup>nd</sup> Mid-Term Exam:	20%	(week #12)
Assignments/Projects:	10%	(Lab work)
Final comprehensive exam:	40%	(week #16)

### **Notes:**

Solutions to some of the homework problems will be available in the instructor's Website, the next week they are assigned. Also a message board will be available for the students to ask subject-related questions.

## *Detailed Course Contents*

- Chap. (1) **Introductory Digital Concepts:** Digital and analog quantities, Binary digits, logic levels, digital waveforms, Basic logic operations, Basic logic functions, Digital ICs, Testing and troubleshooting instruments, Applications,
- Chap. (2) **Number Systems, Operations, and Codes:** Decimal numbers, Binary numbers, Decimal-to-binary conversion, Binary arithmetic, 1's and 2's complements of binary numbers, signed numbers, Arithmetic operations with signed numbers, Hexadecimal numbers, Octal numbers, BCD, Digital codes, Applications.
- Chap. (3) **Logic gates:** Inverters, AND gates, OR gates, NAND gates, NOR gates, XOR and XNOR gates, IC logic families, troubleshooting, Applications.
- Chap. (4) **Boolean Algebra and Logic Simplification:** Boolean operations and expressions, Laws and rules of Boolean Algebra, DeMorgan's theorems, Boolean analysis of logic circuits, Simplification using Boolean Algebra, Standard forms of Boolean expressions, Boolean expressions and truth tables, Karnaugh map, K-Map SOP simplification, K-Map POS simplification, more than four-variables K-Maps, Applications.
- Chap. (5) **Combinational Logic:** Special combinational logic circuits, Implementing combinational logic, Universal properties of NAND and NOR gates, Combinational logic using NAND and NOR gates, Operation with Pulse waveforms, Troubleshooting, Applications.
- Chap. (6) **Functions of Combinational Logic:** Basic adders, parallel binary adders, Ripple carry vs. look-ahead carry adders, comparators, Decoders, Encoders, Code converters, Multiplexers (data selectors), Demultiplexers, Parity generators and data checkers, troubleshooting, Applications.
- Chap. (8) **Flip-Flops and Related Devices:** Latches, Edge-triggered Flip-Flops, Master-Slave Flip-Flops, Flip-Flop operating characteristics, Flip-Flop applications, One-shots, the 555 timer, Troubleshooting, applications.
- Chap. (9) **Counters:** Asynchronous counter operation, Synchronous counter operation, Up/Down synchronous counters, Design of synchronous counters, Cascade counters, Counter decoding, Counter applications, Troubleshooting, Logic symbols with dependency notation, Applications.
- Chap. (10) **Shift Registers:** Basic shift register functions, Serial in/Serial out shift registers, Serial in/parallel out shift registers, parallel in/serial out shift registers, Parallel in/parallel out shift registers, Bi-directional shift registers, Shift register counters, Shift register applications, troubleshooting, Logic symbols with dependency notation, Applications.
- Chap. (7) **Very Brief Introduction, if time permits!**

## *Weekly Breakdown (Tentative)*

Week	Date	Subject	Remarks
1	02/24/04	Introduction + Chapter (1)	1 <sup>st</sup> lecture
2	03/02/04	Chapter (1) – Chapter (2)	
3	03/09/04	Chapter (3)	1 <sup>st</sup> HW assignment
4	03/16/04	Chapter (3)	
5	03/23/04	Chapter (4)	
6	03/30/04	Chapter (4)	
7	04/06/04	Review – Chapters (1), (2), (3), and (4)	1 <sup>st</sup> Mid-term Exam
8	04/13/04	Chapter (5)	2 <sup>nd</sup> HW Assignment
9	04/20/04	Chapter (5) + Chapter (6)	
10	04/27/04	Chapter (6)	
11	05/04/04	Review – Chapters (5) and (6)	
12	05/11/04	Chapter (8)	2 <sup>nd</sup> Mid-Term Exam
13	05/18/04	Chapter (8)	3 <sup>rd</sup> HW Assignment
14	05/25/04	Chapter (9)	
15	06/01/04	Chapter (9) + Chapter (10)	4 <sup>th</sup> HW Assignment
16	06/08/04	Review – Chapters (8), (9), and (10)	End-of-Term Exam