

## **EC535- Digital VLSI Design**

### **CREDIT HOURS**

3 Hours

### **CONTACT HOURS (Hours/week)**

Lecture: 2; Tutorial: 2

### **COURSE COORDINATOR**

Dr. Khaled Shehata

### **TEXT BOOK**

N. Weste, "CMOS VLSI DESIGN: CIRCUITS & SYSTEMS PERSPECTIVE", 3<sup>rd</sup> ed., Pearson, 2005

### **COURSE DESCRIPTION**

Design of VLSI digital circuits, Stick diagrams, design rules, CAD system, speed and power considerations, floor planning, layout techniques

### **PREREQUISITE:**

CC 216, EC 432

### **RELATION OF COURSE TO PROGRAM**

Elective

### **COURSE INSTRUCTION OUTCOMES**

The student will be able to gain knowledge and develop skills on: Design of Digital VLSI Circuits, Stick Diagram, Design Rules, CAD Systems, Speed and Power Considerations, Floor Planning, Layout techniques.

### **TOPICS COVERED**

- Revision (MOSFET Physics)
- Mapping Boolean functions to transistor level
- Euler's Path, Stick Diagramming Rules, Color Codes, Design Rules.
- The CMOS Inverter – DC Characteristics
- Pass Transistor Logic, Transmission Gates
- CMOS IC Fabrication Steps, and Design Rules
- Delay in logic circuits
- Logical Effort
- Interconnects, Crosstalk
- Power Dissipation
- Combinational Circuit Families
- Sequential Circuit Design
- Concepts of Pipelining, Latency, and Throughput

**CONTRIBUTION OF COURSE TO MEET THE REQUIREMENTS OF CRITERION 5:**

<b>Professional component Content</b>			
<b>Math and Basic Sciences</b>	<b>Engineering Topics</b>	<b>General Education</b>	<b>Other</b>
	✓		

**RELATIONSHIP OF COURSE TO STUDENT OUTCOMES:**

<b>Student Outcomes</b>		<b>Course aspects</b>
A	An ability to apply knowledge of mathematics, science, and engineering	
B	An ability to design and conduct experiments, analyze and interpret data.	b <sub>1</sub> b <sub>2</sub> b <sub>3</sub> b <sub>4</sub>
C	An ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health, and safety, manufacturability, and sustainability	c <sub>1</sub> c <sub>2</sub> c <sub>3</sub>
D	An ability to function on multi-disciplinary teams.	d <sub>1</sub> d <sub>2</sub> d <sub>3</sub> d <sub>4</sub>
E	An ability to identify, formulate, and solve engineering problems	e <sub>1</sub> e <sub>2</sub> e <sub>3</sub>
F	An understanding of professional and ethical responsibility	
G	An ability to communicate effectively	
H	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and social content	
I	A recognition of the need for, and an ability to engage in life-long learning.	
J	A knowledge of contemporary issues within and outside the electrical engineering profession.	j <sub>1</sub> j <sub>2</sub>
k	An ability to use the techniques, skills, and modern engineering tools necessary for electrical engineering practice.	k