

# VLSI Design

361.1.3751

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## Lectures (1h):

### 1. Introduction

- *Scope of course*
- *Course Logistics*
- *VLSI concepts*

### 2. Digital Layout techniques

- *Basic inverter Layout*
- *Stick Diagram & Euler Path*

### 3. VLSI design reliability

- *Electrical Over-Stress (EOS)*
  - Electrostatic discharge (ESD)*
  - Electro-migration effects*
  - The Antenna effect*
- *Latch-up*

### 4. Analog layout techniques

- *Mismatches*
- *Etch Effect problem and solution with dummies*
- *Common-centroid Arrays*
- *Layout example with Common-centroid technique*

### 5. Passive components layout techniques

- *Resistors*
- *Capacitors*

- *Inductors (optional)*
- *Parasitic in MOSFET*

#### 6. *Differential amplifier – part a*

- *Introduction*
- *Topology*

#### 7. *Differential amplifier – part b*

- *Behavior*
- *Schematic and layout design considerations*

#### 8. *Analog-to-digital converter - part a*

- *Introduction*
- *Basic topologies*
  - Flash ADC*
  - Slope ADC*
  - SAR ADC*

#### 9. *Analog-to-digital converter - part b*

- *Basic topologies*
  - Pipeline ADC*
  - Sigma- Delta ADC*

#### 10. *Delay-line*

- *Delay-element*
- *Basic topologies and architectures*

#### 11. *Delay-line ADC*

- *One step DL-ADC*
- *Two steps DL-ADC*
  - N-buffers string based DL-ADC*
  - Ring Oscillator based DL-ADC*