



**United International University**  
*QUEST FOR EXCELLENCE*



**CSE 1326: Digital Logic Design Lab**  
**Implementing Functions:**  
**Simple and not so Simple**  
**United International University**

# Today's Experiment (1)

- Implement the following functions using basic gates we studied in the last lab class in both logism and trainer board.
  1.  $F(A, B, C) = AC + B'C$
  2.  $F(A, B, C) = (C' + B'A)B'$

[FYI: The process of deriving these functions is described in the next slide as a supplemental material.]

# Supplemental Material: Digital Circuit Design Process

1. **Problem Description:** Security system for a room – 1 door, 1 window. If any one of the door or window is broken, the **output, F** will be 1, otherwise 0.
  - A – the door is in good shape, 1, A' - broken, 0
  - B – the window is in good shape, 1, B' - broken, 0
- 2) **Derive the Truth Table (TT)** from the description
- 3) **Derive the function from TT:** Logical **sum** of those **minterms** for which the function has value 1.
  - $F = A'B' + A'B + AB'$
  - For minterms, we use lower 'm'.
  - So, 00 is m0

A	B	F	Min Term	
0	0	1	A'B'	m0
0	1	1	A'B	m1
1	0	1	AB'	m2
1	1	0	AB	m3

# Using Logisim

- We will learn how to analyze combinational circuits
  - [Opening Combinational Analysis](#)
  - [Editing the truth table](#)
  - [Creating expressions](#)
  - [Generating a circuit](#)

# Today's Experiment (2)

- Simplify and implement the following equation

$$F(A, B, C, D) = ABC'D + A'BCD' + ABC + AB'C'D' + ABD' + AB'C$$

with necessary gates

- We will minimize the function
  - Using logisim

# Writing Report

- For Experiment (1), the report should contain the following for any one of the two functions in slide 2:
  - The list of ICs you have used to implement the function
  - Truth table of the function
  - Draw the circuit (Logic gate) diagrams
    - You can attached printed logisim diagram.
- For Experiment (2)
  - Truth table of minimized function
  - Number of literals in both original and minimized functions