

ECET 109 - Digital Fundamentals

2004 Catalog Data: (3 cr.) Class 2, Lab 2. P or C: Math 111 or higher or consent of instructor. A study of logic gates, binary arithmetic codes, Boolean algebra, mapping, adders, comparators, decoders, encoders, multiplexers, and demultiplexers. Small scale (SSI), medium scale (MSI), integrated circuits and programmable logic devices are used to develop combinational and sequential circuits.

Textbook: Floyd, *Digital Fundamentals with EWB*, Prentice Hall, 8th ed., 2003, ISBN 0130394653.

ECET 109 Lab Manual, Tichenors Publishing, 2003.

References:

Required

Supplies: ECET 109 Digital Fundamentals Parts Kit (available at IUPUI Bookstore)
ECET 109 Digital Fundamentals Project Kit (available at IUPUI Bookstore)
Breadboard & Breadboard Jumpers (available at IUPUI Bookstore)

Course Coordinator: Kenneth Reid kreid1@iupui.edu

Goals/Objectives: (*assessment survey evaluates objectives*)

1. Convert binary, decimal, and hex numbers from one to the other.
2. Find negative binary numbers (2's complement), and add and subtract binary numbers.
3. Produce truth tables for Buffer, Inverter, AND, NAND, OR, NOR, XOR, and XNOR, gates and combinations of gates.
4. Given a table of Boolean Algebra rules, apply them to simplify a complex equation.
5. Fill in a K-Map from an equation or truth table and fill in a truth table from a K-map.
6. Simplify an equation using a K-map (2,3, or 4 variable), in either SOP or POS form.
7. Draw a circuit from an equation.
8. Change an SOP equation/circuit into a NAND/NAND equation/circuit, and a POS to a NOR/NOR.
9. Use WinCUPL to program GAL devices to perform as any combinational circuit which will fit into the chip.
10. Find outputs for any given input for adders (subtractors), comparitors, multiplexors, demultiplexors, decoders, encoders, and parity generators.
11. Program these functions into a PLD using equations.
12. Build any combinational circuit with gates or with MSI circuits on a breadboard.
13. Design and simulate any circuit with Multisim software.
14. Prepare written lab reports given writing guidelines.

15. Work effectively in laboratory teams.

Course topics:

1. Introduction, Logic Concepts
2. Numbering Systems
3. Number Conversions
4. Binary addition
5. 2's complement
6. Logic gates
7. Boolean Expressions
8. PLDs
9. K-Maps
10. BCD
11. Decoders
12. BCD-Segment Decoders
13. Compare
14. Adders
15. Encoders
16. Mux and De-Mux
17. Parity Checker

**For specific information regarding course topics and laboratory assignments
contact course coordinator.**