

ECE 2500: Digital Logic Required Course

2006-2007 Catalog Data: Analysis and design of combinational and sequential logic systems.
Credit: 3 hours
Prerequisites: High school algebra

**Textbook(s) and/or
Required Materials:**

1. Wakerly, *Digital Design*, 4th Ed., Prentice-Hall, New York, 2000
2. Lab Manual (online): homepages.wmich.edu/~johnson/ece250/prelab/lab1.pdf
3. Laboratory notebook (bound, square gradicule).

Recommended Materials: None given

Reference Materials: None given

Course Coordinator: Dr. Dean R. Johnson, Associate Professor, ECE

Instructor (Fall 2006): Dr. Dean R. Johnson, Associate Professor, ECE

Prerequisites by Topic:

1. High School Algebra

Course Objectives: (ABET Learning Outcomes)

ABET learning outcome assigned to this course by ECE Assessment Plan: c and d

This course develops

1. To develop ability to formulate and optimize logic circuits so they satisfy a specification (c).
2. To develop ability to function on a multidisciplinary teams in the laboratory (d).

Topics:

1. Introduction to digital logic. (1 class)
2. Boolean Algebra. (3 classes)
3. Logic gates and circuits. (2 classes)
4. Binary numbers and base conversions. (1 class)
5. Minterms and maxterms. (2 classes)
6. Karnaugh maps. (2 classes)
7. Important types of combinational logic circuits. (2 classes)
8. ROMs and programmable logic circuits (PLDs). (2 classes)
9. Sequential logic circuit overview. (1 class)
10. Flip-flops and clocks. (2 classes)
11. Sequential circuit design procedures. (4 classes)
12. Important types of sequential logic circuits. (2 classes)
13. A simple computer architecture. (1 class)
14. Tests. (4 classes)

Course/Laboratory Schedule: 2 hours lecture, 3 hours laboratory

Evaluation:

1. Examinations (65%)
2. Laboratory (25%)
3. Homework (10%)

Laboratory Projects:

1. Introduction to Logic Circuits
2. Combinational Logic Circuits
3. NAND, NOR and XOR Circuits
4. Adder Design
5. Combinational Circuit Design

6. Standard MSI Circuits
7. Lab Assessment #1
8. Latches and Flip-Flops
9. Counters and Shift Registers
10. Sequential Circuit Design
11. Advanced Sequential Circuit Design
12. Lab Assessment #2

Computer Usage:

1. *Xilinx* logic circuit design software employed for logic design, simulation and implementation.
2. Internet browser employed to access lecture and laboratory materials, including on-line quizzes.

Contribution to Professional Component:

ABET professional component content as estimated by faculty member who prepared this course description:
Engineering Science: 3 credits or 100%

Relation of Course to Program Outcomes:

This course provides significant support for:

- EE and CE program objectives Depth and Breath
- ECE expected learning outcomes c, d

Person who prepared this description and date of preparation:

Prepared by: D.R. Johnson

Date: May 27, 2007