EL E 336 – Digital Systems Laboratory I
Fall Semester 2003

2003 Catalog Data: EL E 336. DIGITAL SYSTEMS LABORATORY I. Corequisite: EL E 335. (3 lab hours). (1).

Prerequisite by Topic: None

Textbook: A. W. Glisson, *Laboratory Manual for Digital Systems Laboratory EL. E. 336*, 3rd edition (revised 1998), Department of Electrical Engineering, University of Mississippi, 1998.

Reference Texts: *Logic and Computer Design Fundamentals*, by M. M. Mano and C. R. Kime
Fundamentals of Logic Design, by C. H. Roth, Jr.
Digital Design Fundamentals, by K. J. Breeding

Coordinators: Mark D. Tew, Associate Professor of Electrical Engineering, and Allen W. Glisson, Professor of Electrical Engineering

Objectives: Students will obtain "hands-on" experience in constructing combinational logic and synchronous sequential circuits at the gate level, and will be introduced to assembly language programming and the use of programmable logic devices.

Outcomes: At the end of this course students will be able to:

Understand and use logic conventions in the implementation of combinational logic circuits. [1,2,a]

Obtain canonical sum-of-products and product-of-sum expressions from logical truth tables. [1,2,a]

Apply DeMorgan's theorem to convert mixed-operation logical expressions into All-Nand operation forms. [1,2,a]

Develop and implement combinational logic circuits from truth tables or logical expressions. [1,2,a,b,c]

Develop and implement simple code translation logic circuits. [1,2,a,b,c]

Develop and implement programmable logic circuits. [1,2,a,b,c]

Understand, use, and describe elementary concepts of assembly language programming. [1,2,a,g,k]

Develop, implement, and describe the operation of simple synchronous sequential circuits. [1,2,a,b,c,g]

Use a circuit capture and simulation program to design digital logic circuits. [1,2,a,b,c,k]

Topics:

1. Logic conventions and indicators (1 class)
2. Logic gates and logic operations (1 class)
3. Min-term representations and implementation of simple logic functions (1 class)
4. Max-term representations, multiple output networks, and fan-in capability (1 class)
5. Code translation (1 class)
6. Controlled circuits, memory addressing (1 class)
7. Construction of flip-flops (1 class)
8. Registers (1 class)
9. Assembly language/Computer simulator (1 class)
10. Circuit simulation and programmable logic devices (2 classes)

Computer Usage:

One experiment on machine and assembly language programming using a RISC computer simulator, the Ole Miss Teaching Computer (OMTC), on a PC (1 class)

One experiment in circuit simulation and programming of Programmable Logic Devices using computer simulation software for digital circuits (2 classes)

Equipment and Software Usage:

Digiac 4010 Digital Logic Trainer
Personal Computer
Ole Miss Teaching Computer (OMTC) simulator
Altera MAX+plus II

Contribution of Course to Professional Content of Programs:

This course contributes to the professional component of the degree programs by covering concepts in the area of engineering topics (engineering sciences).

Prepared by: A. W. Glisson, Fall 2003 **Date:** August 17, 2003