ESC 306 – Digital Circuits
Syllabus

Credit
4 semester hours
(3 lecture hours per week, 3 laboratory hours per week)

Prerequisites
PHY 152 or 252 (Second semester physics) or instructor's consent

Course Description
Binary, hexadecimal, octal number systems, Boolean algebra, binary logic, Karnaugh maps, digital circuit principles, flip-flops, switches, counters, basic computer circuits, LED's, introduction to microprocessors.

Rationale for Course
Physics is the study of the physical phenomena that we observe in our universe. It is broad ranging and essential to all the sciences. This course aims to introduce the fundamental concepts of logic gates, applying these concepts to the design of digital circuits. Students will develop problem solving skills, learning how to logically approach and evaluate a variety of physical situations.

Learning Objectives
- The student will learn to apply switching theory to the solution of logic design problems.
- The student will become proficient in the use of Boolean algebra to analyze and synthesize switching circuits.
- The student will be able to design circuits of logic gates with specified relationships between input and output signals.
- The student will become familiar with the logical properties of flip-flops, and will use flip-flops in combination with circuits of logic gates to design logic circuits of higher complexity.

Academic Integrity
Students are expected to be honest and to submit their own work on exams and research papers. Strict adherence to the Mississippi College "Honesty Policy" (*2009-2010 Mississippi College Undergraduate Bulletin, pg. 60*) will be followed.

Course Outline
- Number Systems and Conversion
- Boolean Algebra
- Applications of Boolean Algebra
- Karnaugh Maps
- Quine-McClusky Method
- Multi-Level Gate Circuits
- Multiplexers, Decoders, and PLD's
- Latches and Flip-Flops
- Registers and Counters
- Introduction to Microprocessors
- Ethics in Design

Method of Instruction

Class will consist primarily of presenting fundamental physics and engineering concepts, working problems, and discussing in-class demonstrations. Key points will be highlighted by the choice of examples, and these points will be discussed in the context of the example.

Required Text and Materials

Fundamentals of Logic Design, 5th Edition, by Charles Roth

Grading

The final average will be computed as follows: 50% will be from lecture tests, 10% from homework, 20% from lab, and 20% from the final exam. The final exam is comprehensive.

Scale:	Grade	Final Average
	A	90-100
	B	80-89
	C	70-79
	D	60-69
	F	0-59

Makeup Tests

Makeup tests will be given only under the following circumstances:

- Consent of the instructor has been obtained prior to the test.
- An excused absence is obtained from a doctor or the Vice-President for Academic Affairs

Absences

Mississippi College policies on attendance and academic integrity will be enforced. Please see the *2009-2010 Mississippi College Undergraduate Bulletin, pg. 56-57* for additional details of these policies. Students are responsible for all work missed during an absence.

Special Needs

If you need special accommodations due to learning, physical, psychological, or other disabilities, please contact Dr. Buddy Wagner in the Counseling and Career Development Center. He may be reached by phone at 601-925-3354.

Computer Usage: Homework and lab assignments using LogicAid, SimUaid, DirectVHDL, or LogicWorks.