Course Title: Digital Electronics and Logic Design

Course Description:
Teaches number representation in digital systems; Boolean algebra; design of digital circuits, including gates, flip-flops, counters, registers, architecture, microprocessors, and input-output devices. Also includes assembly programming; theory of logic functions; mapping techniques and function minimization; and design of other combinational, clocked sequential, and interactive digital circuits (e.g., comparators, pattern detectors, adders, and subtractors). Provides students the opportunity to use the above basic skills in the laboratory to design and fabricate digital logic circuits. Prerequisite: EGR 124 or equivalent. Lecture 3 hours. Laboratory 2 hours. Total 5 hours per week.

General Course Purpose:
This course serves as an elective course in the Engineering AS degree program. It is a required course for electrical and computer engineering students in the BSEE and BSCPE degree curricula.

Course Objectives:
Upon completing the course, the student will be able to
1. Understand and use binary and hexadecimal number systems and Boolean algebra.
2. Select and apply appropriate techniques for designing combinational logic circuits.
3. Understand and utilize Karnaugh maps for simplification of Boolean expressions.
4. Design combinational logic circuits for fundamental operations (such as adders, decoders, and related devices).
5. Select and apply appropriate design techniques for sequential logic circuits.
6. Design sequential logic circuits for fundamental operations (e.g., counters).
7. Describe the basic concepts of Register Transfer Language and Hardware Description Language.
8. Describe the basic organization of a computer.
9. Develop a basic Assembly Language program.

Major Topics to be Included
1. Binary and hexadecimal number systems; Boolean algebra
2. Design techniques for combinational logic circuits
3. The Karnaugh map – simplification of Boolean expressions
4. Design of combinational logic circuits for fundamental operations (e.g., adders, and decoders)
5. Design techniques for sequential logic circuits
6. Design of sequential logic circuits for fundamental operations (e.g., counters)
7. Register Transfer Language and Hardware Description Language
8. Basic computer organization
9. Assembly programming

Effective Date of Course Content Summary: August 20, 2012