SHAWNEE STATE UNIVERSITY
COURSE SYLLABUS

ETEM 2212
Digital Logic

Instructor: Carl Priode
Office: ATC 324
Phone: 740-351-3368
E-mail: cpriode@shawnee.edu
Office Hours: Tba
Dept.: Industrial & Engineering Technologies

Credit Hours:
3 lecture 3 lab 4 credit hours
This course is a combination of two 4 credit hour quarter courses into one 4 credit hour semester course with compression of material.

Class Location and Meeting Times:
Lecture – ACT 201 Lab – ATC 304

Materials Needed:
Digital Systems: Principles and Applications, Ronald J. Tocci

Course Description:
ETEM 2212, Digital Logic (4) – Introduction to solid state, integrated electronic logic, practical applications of Boolean Algebra, logic gates, binary pulse circuits, number systems, and computer arithmetic. Integrated circuit applications which include combinational and sequential logic, printed circuits, counters, registers, decoders, signal converters, and an introduction to microcomputers. Preq. ETEM 1216. 3 lec. 3 lab. § ET.

Goals and Objectives:
The goal of the course is to familiarize the student with basic electronic logic concepts and practices. The applications of solid state logic devices, discrete and integrated, will be emphasized. An introduction to microcomputers will also be studied.

The student will achieve the following learning objectives provided he/she follows and completes the prescribed course format:

- Recognize number systems, operations and codes.
- Describe function of basic logic gates, e.g. AND, OR, EXOR, NOR, NAND
- Demonstrate capability of analyzing, designing and troubleshooting: a) discrete and integrated switching and logic circuits; b) discrete and integrated regenerative circuits.
  - Be capable of performing basic switching analysis by using Boolean Algebra.
  - Use Boolean algebra to simplify and reduce boolean expressions to minimize digital circuitry.
- Implement combinational logic circuits using expressions derived from using DeMorgan’s theorem and Karnaugh maps.
- Be capable of applying computer arithmetic
- Define the function of encoders and decoders and describe typical applications.
- Define the function of multiplexers and demultiplexers and describe typical applications such as serial and parallel data conversion for both input and output data.
- Define the function of adders, subtractors, and Arithmetic Logic Units (ALU).
- Describe the various types of flip-flops (R-S, J-K, D), latches, and related devices and illustrate typical applications.
Introduction to counter and register circuits. Analysis of various mod configurations for counters.
Define characteristics of the various logic families and IC circuit technologies.
Describe semiconductor memory circuits and addressing schemes.
Define characteristics of microprocessors and discuss differences with computers and microcontrollers.
Discuss aspects of Programmable Logic Devices and other VHDL circuits and describe typical applications.
Demonstrate the use of digital integrated circuits in semi-sophisticated applications.
Be capable of performing semi-sophisticated circuit design and troubleshooting in using integrated elements.
Through laboratory utilization gain a basic familiarization with the operation of microcomputers.
Have a working knowledge of printed circuit techniques.
Experience a positive change in professional confidence and thinking ability.
Experience a positive change in creativity.

Student Responsibilities
Two exams

ATTENDANCE POLICY: Attendance is decided entirely by the student, but regular attendance is advised. For the purpose of evaluation, attendance will be recorded.

All cell phones and lap top computers will be turned off and put away during lecture.

SAFETY: The safety of all class participants is of primary concern and takes precedence over all other considerations. All participants must act responsibly and operate equipment in a safe way, consistent with written and verbal instructions. Deliberate misuse of equipment, failure to follow safety procedures, or any horseplay will result in immediate disciplinary action. No drinking, eating, or use of tobacco products is allowed in classrooms or laboratories.

University Disability Statement
For students who have a specific physical, psychiatric, or learning disability and require accommodations, please let me know early in the quarter so that your learning needs may be appropriately met. By law, it is your responsibility to provide documentation of your disability to the Office of Disability Services, located in the Student Success Center, Massie Hall, (Ph) 351-3594, PRIOR to receiving services.

Evaluation:

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<td>Lab Performance</td>
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Instructional Delivery Method:
The majority of the instruction will be of lecture type. Students will be permitted question and discussion times during the lectures. The lectures will be structured but will be semiformal. Overhead transparencies will accompany nearly all lectures. Several lectures will be accompanied by appropriate demonstrations. Some lecture time will be utilized for the purpose of in-class special assignments. Special assignments may be given for both in an out of class work.
During the lecture development for each chapter, suggested problem assignments will be given. The purpose of these assignments is to give the student the opportunity to enhance the learning process for the particular subject being presented in the lectures. At an appropriate time, problem assignment solutions will be provided to the student. Do not consider these problems as ‘homework.’ They will not be collected, graded and returned. However, the subject content of the problems will be used for the development of quizzes and exams.

LABORATORY COMPONENT: The nature of the laboratory component is more subjective than objective. Items such as attendance, attitude, ability to work with others, confidence, cooperation, performance, safety, organization, and use of time comprise the material for course grade consideration.

**Licensure or Accreditation Statement**
N/A

**Topics to be Covered**

- Introduction to Digital Logic
- Number Systems
- Logic Gates
- Boolean Algebra, DeMorgan's Theorem, Karnaugh maps.
- Combinational Logic Circuits
- Flip-Flops
- Digital Arithmetic
- Operations and Circuits
- Counters, Registers
- IC Logic Families

- MIS Logic
- Interfacing
- Memory Devices and addressing schemes
- Programmable Logic Devices
- Microprocessor