EET 252
Digital Electronics

Department of Technology
Spring 2008

Instructor:
Prof. Vigs Chandra, PhD

Telephone:
859-622-1187

E-mail:
vigs.chandra@eku.edu

Web:
http://people.eku.edu/chandrav

Office:
405 Whalin Technology Complex

Class schedule:
Section: 001, CRN: 10152; MW: 10:10 am – 12:05 pm, Room 407/400

Office Hours:
TR: 8 – 10 am, MTWR: 4:30 – 6:00 pm. If my office door is open at other times I will most likely be available for discussion. Come right in.

Credit hours:
3

Prerequisite:
Grade of at least a "C" in MAT 090 or equivalent

COURSE DESCRIPTION:
A survey of digital electronics fundamentals and applications. Digital mathematics, logic families, logic gates, multiplexers, comparators, counters, decoders, displays, converters, memory systems, and microcomputer systems are covered in a combination of lecture, demonstration, and laboratory.

TEXTBOOK:
The Science of Electronics: Digital, Thomas Floyd & David Buchla, 1st Edition; Prentice Hall publishers; ISBN: 0-13-087549-X

COURSE OBJECTIVES:

Upon completing EET 252 the student should be able to:

A. Understand basic concept of Electricity/Electronics pertaining to digital devices.

B. Define the two state concepts, and understand Binary, Octal, and Hexadecimal number systems.

C. Binary addition and subtraction.

D. Sketch the symbol for and describe the operation of AND, OR, INVERTER, NAND, NOR, XOR, XNOR gates.

E. Use of Truth Tables for designing and implementing digital circuits for given design specifications.

F. Sketch the symbol for and describe the operation of a 7-segment display, decoder, encoder, multiplexer, demultiplexer, binary comparator, flip-flop, latch, counter.

G. Interpret the manufacturer's specifications for a given digital component and then use the specifications to construct and test a given circuit.

H. Simulate the operation of digital circuits using Multisim 7© to test circuit designs.

I. Describe the operation of memory, tri-state, analog/digital, digital/analog conversion devices

J. Describe the function of memory, MPU, and I/O parts in a computer system.

COURSE OUTLINE:

A. Digital electronics introduction
   1. Binary, Octal, and Hexadecimal number systems
   2. Two-state electrical representation
   3. Binary Codes
   4. Addition of binary numbers
   5. Subtraction of binary numbers

B. Logic gates and devices
   1. Basic logic gates
      a. INVERTER (NOT)
      b. AND
      c. OR
      d. NAND
      e. NOR
      f. XOR
      g. XNOR

COURSE OUTLINE (continued):

2. Boolean logic
   a. DeMorgan's theorems
   b. Boolean algebra and logic circuit minimization
   c. Karnaugh Maps
   d. Devices implementing combinational logic functions

3. Sequential Circuits
   a. flip flops – D, JK
   b. latches
   c. counters
   d. displays

4. Overview of interfacing circuits with external devices
   a. Data, address, and control buses
   b. Tri-state devices
   c. Memory – ROM, RAM
   d. Digital computer organization
   e. Input devices – digital inputs, analog inputs
   f. Output devices – digital outputs, analog outputs
   g. Digital/Analog conversion
   h. Analog/Digital conversion
   i. Interfacing microcomputer systems

COURSE REQUIREMENTS:

Student are expected to:

- Attend each lecture and laboratory session.
- Complete all assignments and laboratory activities on time.
- Take all assessments.
- Maintain a 3-ring binder or folder for organizing class materials.

EVALUATION:

Each student will be evaluated as follows:

- 3 Assessments (40%),
- Homework (10%),
- Lab assignments (40%),
- 2 two-page write-ups on digital electronics topics (10%)

1st assessment – (in-class) covering chapter 1, part of 5 & 6; and labs. To be held during the 5th week (Feb. 11 – 15) of the semester.
2nd assessment – (in-class) covering chapter 2, 3, 4, and part of 5 & 6; and labs. To be held during the 11th week (March. 24 – 28) of the semester.
Final Assessment – (in-class, **Comprehensive**; and labs). To be held Monday, May 5, 10:30 – 12:30 pm.

Assessment average = Equally weighted (1st + 2nd + Final) Assessments

EVALUATION (continued):

You may rework and resubmit your labs, homework, papers and assessments (excluding the final) for limited partial credit.

Homework: There will be approximately 10 homework assignments covering material from the text and topics discussed in class.

Lab Assignments: There will be approximately 13-15 labs as time permits, each weighed equally. As needed, midway in the semester there may be a lab skills assessment which will count as 2 lab sessions.

Digital electronics topics write-ups: 2 articles related to digital electronics topics are required, each of length at least 2 pages, excluding references. A sample paper in APA format is available in the External Links section of Blackboard. If you choose to write more than 2 papers, the score of the highest 2 papers will be counted towards the overall grade.

Topics for the paper include but are not limited to: principles of operation of electrical devices being discussed in class, numbering systems used in computers, practical applications of digital circuits, futuristic digital devices which will greatly enhance work productivity as well as our quality of life, integration of digital and analog devices, controllers for video games, embedded systems, etc. A complete bibliography of the sources referred to while preparing the articles is to be provided, including any material summarized from any internet web sites.

For identifying sources of technical articles, refer to the online EKU library databases. An online video tutorial on using the EKU library databases for retrieving articles on computer systems and which can be used as an example is available at: http://www.people.eku.edu/chandrav/Ref/online_search_EKU_libraries.wmv.

Attendance Policy:

After the second unexcused absence, each unexcused absence will cause 3 percent deduction in the overall percentage. Five (5) and seven (7) unexcused absences will result in one letter grade lower each. Your grade will be an automatic F if you have more than seven (7) unexcused absences. Makeup labs/exams will be permitted only if you had sought and received my approval prior to the absence which caused you to miss the related lab/exam. You will benefit most by way of understanding the content of the course by completing all the assignments in a timely manner. If you know in advance that you will be absent, please inform me at the earliest. Email (vigs.chandra@eku.edu.edu) usually is the fastest way of contacting me, or you may call (859) 622-1187.

Academic Integrity Statement

Students are advised that EKU's Academic Integrity Policy will strictly be enforced in this course. The Academic Integrity policy is available at http://www.academicintegrity.eku.edu. Questions regarding the policy may be directed to the Office of Academic Integrity.

Grades:

100%-90%	=	A	69.9%-60%	=	D
89.9%-80%	=	B	59.9%-0%	=	F
79.9%-70%	=	C			

Mid-term grades will be made available to students by Saturday, March 8, 2008.

Monday, Jan. 21, 2008 - Last day to register for or add/drop full-semester classes.
End of Add/Drop period: Last day to drop a course without a "W" appearing on the university transcript, last day to register for or add additional full-semester courses. Last day to convert "Pass/Fail" or "Audit" classes to a normal grade and credit option.

Friday, March 21, 2008 - Last day to "withdraw" with a "W" from a full-semester class or from the University

Tuesday, May 13, 2008 – Final grades available online through EKU Direct

STATEMENT OF DISABILITIY:
ADA

If you are registered with the Office of Services for Individuals with Disabilities, please make an appointment with the course instructor to discuss any academic accommodations you need. If you need academic accommodations and are not registered with the Office of Services for Individuals with Disabilities, please contact the office on the third floor of the Student Services Building, by email at disabilities@eku.edu or by telephone at (859) 622-2933 V/TDD. Upon individual request, this syllabus can be made available in alternative forms.

😐 The work you do in the laboratory, and the grade you earn, should reflect your personal abilities, and accomplishments. Individual homework and lab reports are required from each student. I encourage you to discuss your assignments with other students. However any work you submit must be your own.

☺ Any suggestions leading to improvements in the content or presentation of the course, especially in the laboratory work, are most welcome.