

## ELEG 2134: Digital Logic Design Syllabus

- 2008-2009 Catalog Data: Corequisite: ELEG 2130. Prerequisites: COMS 2803 or COMS 2104. Binary numbers and codes, Boolean algebra, combinational and sequential logic, minimization techniques, memory systems, register transfers, control logic design, state machines. Lecture three hours.
- Textbook: J. F. Wakerly, *Digital Design: Principles and Practices*, 4<sup>th</sup> edition, Pearson Prentice Hall, 2005.
- References: 1. [Texas Instruments Parts Search \[http://www-s.ti.com/sc/docs/psheets/pids2.htm\]](http://www-s.ti.com/sc/docs/psheets/pids2.htm)  
2. [Digital Design: Principles & Practices \[http://www.ddpp.com/\]](http://www.ddpp.com/)
- Coordinator: Dr. Carl Greco, Associate Professor of Electrical Engineering
- Prerequisites by topic: 1. Familiarity with the use of computers.  
2. Sufficient acumen to apply techniques acquired in lecture toward the design of combinational and sequential circuits.
- Objectives: 1. Ability to use and convert between different number systems including binary, hexadecimal and octal. [1]<sup>1</sup>  
2. Ability to apply Boolean algebra to digital system.  
3. Development of combinational design techniques at the gate and medium-scale integration (MSI) level. [1,3]  
4. Development of sequential logic design techniques at the gate and MSI level. [1,3]  
5. Introduce the student to digital electronic hardware design at the medium and large scale integrated circuit level using a Hardware Description Language, for example VHDL or Verilog. [1, 3]  
6. Preparation of formal written lab reports. [1,2,3]
- Topics: 1. Binary number and codes.  
2. Boolean algebra and switching algebra.  
3. Digital circuits and logic families.  
4. Combinational logic design.  
5. Sequential logic design.  
6. Introduction to VHDL

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<sup>1</sup> Refers to the number of the educational objective(s) of the program leading to the BSEE degree at Arkansas Tech University that applies to course objective.

Laboratory and Computer Projects: Weekly 3 hour lab covering the following topics: Binary and BCD Counting; Configure a 4-bit binary counter with LED output; Combinational circuit design and minimization; Decoders, multiplexers and encoders; VHDL circuit design and simulation; seven segment LED driver; S-R latch; design a 4-bit counter as a sequential state machine.

Evaluation Methods: A. Homework  
B. Exams and Quizzes  
C. Laboratory projects

Performance Criteria: Objective 1:

1. Students will demonstrate an understanding of the binary, octal and hexadecimal number systems and codes. [A, B]<sup>2</sup>
2. Students will be able to perform simple arithmetic operation with binary numbers. [A, B]

Objective 2:

1. Students will demonstrate an understanding of Boolean algebra and its applications to digital logic design. [A, B]

Objective 3:

1. Students will demonstrate an understanding of digital circuit and logic families. [C]
2. Students will demonstrate an understanding of combinational circuit design and minimization. [A, B, C]

Objective 4:

1. Students will demonstrate an understanding of the design, analysis and application of finite-state-machines in sequential circuit. [A, B, C]

Objective 5:

1. Students will acquire a basic understanding of HDL and its application to the analysis and design of digital logic circuits. [A, B, C]

Objective 6:

1. Students will be able to prepare a formal lab report with sufficient detail to allow their work to be repeated by a knowledgeable individual.

Prepared by: Carl Greco, Assoc. Prof.  
May 30, 2002 (Revised January 13, 2005; August 21, 2006; May 11, 2007)

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<sup>2</sup> Refers to evaluation method(s) to measure student performance.