

ENG EC311 Introduction to Logic Design

2008-2009 Catalog Data:

Coreq: ENG EK 307. Introduction to hardware building blocks used in digital computers. Boolean algebra, combinatorial and sequential circuits: analysis and design. Adders, multipliers, decoders, encoders, multiplexors. Programmable logic devices: read-only memory, programmable arrays. Counters and registers. Fundamental design and verification skills using Verilog HDL and FPGAs. Includes lab. 4 cr.

Class/Lab Schedule:

LEC: 4 hrs/wk, LAB 2 hrs/wk,

Status in the Curriculum: Required

Textbooks and other required materials:

Digital Design by F. Vahid, Wiley 2007;

Verilog for Digital Design by F. Vahid and R. Lysecky, Wiley, 2007

Reference:

Randy H. Katz, Gaetano Borriello, Contemporary Logic Design, Second Edition, Prentice Hall, December 2005

Coordinator:

Alexander Taubin, Associate Professor, ECE department

Prerequisites by topic:

Prereq or coreq: ENG EK 307 Introductory Circuit Theory

Goals:

To provide students with:

- An understanding of the basic tools of logic design
- An understanding of sound design methodologies
- An experience with hardware implementation and the use of CAD tools

Course Outcomes:

As an outcome of completing this course, students should be able to:

- 1) *Understand* the applications of logic design
- 2) *Understand* abstraction and hierarchy in digital design
- 3) *Understand* what components are available for logic design
- 4) *Understand* the use of Boolean algebra in logic analysis and design
- 5) *Understand* logic minimization criteria and methods for use in design
- 6) *Understand* the concept of state in digital systems
- 7) *Design* combinational digital logic systems given specifications

- 8) *Design* sequential digital logic systems (finite state machines) given specifications
- 9) *Implement* logic designs in hardware and with CAD tools
- 10) *Discover* component availability and data using the Internet or other resources

Course Outcomes mapped to Program Outcomes:

Program:	a	b	c	d	e	f	g	h	i	j	k
Course:	1-6	7-9	7-9	7-9	1-10	10	9	10	1-2,10	10	7-10
Emphasis:	5	5	5	3	5	3	3	3	4	3	5

1=not at all; 5=a great deal;

Topics in Project Assignments:

Lab 1: Xilinx ISE tool tutorial;

Lab 2: Truth table and Logic simplification

Lab 3: Variable Boolean function generator

Lab 4: Identicon

Lab 5: 7-Segment LED Decoder

Lab 6: 4-Bit Adder

Lab 7: 3-Bit Counter

Lab 8: Refreshing Control of 7-Segment LEDs

Group project topics: Calculator; Number Puzzler; Scrolling LED display; PS/2 Keyboard; Playing Card Dealer; Reaction Time Timer; PingPong; Reversi; Loggin System; Word Guess

Contribution of Course to Meeting the Professional Component:

Engineering topics: 100%

Prepared by: Alexander Taubin, Associate Professor

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