

EECS 31 INTRODUCTION TO DIGITAL SYSTEMS

(Required for CpE and EE)

Catalog Data:	EECS 31 Introduction to Digital Systems (Credit Units: 4) Digital representation of information. Specifications of combinational and sequential systems. Analysis and design of networks of gates and flip flops. Standard modules and their use. Introduction to algorithmic systems: datapath and control. Prerequisite: EECS10, MAE10, or CSE21/ICS 21. Same as CSE31. Formerly ECE31. (Design Units: 2)
Textbook:	Gajski, Daniel, <i>Principles of Digital Design</i> , 1 st edition, Prentice Hall, 1997.
References:	
Coordinator:	Jean-Luc Gaudiot, Fadi J. Kurdahi
Course Objectives:	This course includes analysis and applications of digital circuits such as gates, decoder, multiplexers, demultiplexers, binary adders, flip flops, and counters.
Course Outcomes:	Students will: Manipulate or design processing of information in binary form. Manipulate or design number representation in binary form. Manipulate or design basic combinational operators (and, or, not, etc) and sequential circuits. Manipulate or design combination of operators to form higher level functions (multiplexer, counter), memory element (flip-flop) controllers, datapath.
Prerequisites By Topic:	Knowledge of computational methods and structured programs in electrical and computer engineering.
Lecture Topics:	Number representation and binary codes. (week 1) Boolean Algebra. (week 2) Combinational logic design principles. (week 3) Combinational logic design practices. (week 4) Review and midterm. (week 5) Introduction to sequential logic, flip-flops, states. (week 6) Sequential logic design principles. State machines. (week 7) Sequential logic design practices. (week 8) Standard RTL(cycle-accurate) modules and networks. (week 9) FSMD, Datapath and control. (week 10)
Class Schedule:	Meets for 3 hours of lecture and 1 hour of discussion each week for 10 weeks.
Computer Usage:	Basic computer skills
Laboratory Projects:	See EECS 31L

Professional Component: Contributes toward the Electrical Engineering and the Computer Engineering Topics Courses and Major Design experience.

Relationship to Program Outcomes: This course relates to the Electrical Engineering Program Outcomes a, b, e and k as stated at: <http://undergraduate.eng.uci.edu/degreeprograms/electrical/mission> and the Computer Engineering Program Outcomes a, b, c, e, m and n as stated at: <http://undergraduate.eng.uci.edu/degreeprograms/computer/mission>

Design Content Description

Approach: The first weeks of this course are devoted to numbers and gates. The remainder of the session provides instruction in the design of: Combinational circuits. Register-transfer circuits, ALUs, multipliers, encoders, decoders, MUXes, DEMUXes. Sequential circuit, counters, registers, register files, finite state machines.

Lectures: 80% Lectures; 20% Homework

Laboratory Portion:

Grading Criteria:

Homework:	20%
Midterm 1:	25%
Midterm 2:	25%
Final Exam:	<u>30%</u>
	100%

Estimated ABET Category Content:

Mathematics and Basic Science: 0 credit units or 0%

Engineering Science: 2 credit units or 50%

Engineering Design: 2 credit units or 50%

Prepared by: Jean-Luc Gaudiot, Fadi Kurdahi **Date:** July 2007

CEP Approved: Fall 2004