

Course	ECE 27000 - Introduction to Digital System Design
Type of Course	Required for CmpE and EE Programs
Catalog Description	An introduction to digital system design and hardware engineering, with an emphasis on practical design techniques and circuit implementation.
Credits	4
Contact Hours	Class: 3, Lab: 3
Corequisite Course	ENGR 12800
Prerequisites by Topics	Basic understanding of circuits (voltage, current, Ohm's Law) and electrical components (resistors, capacitors, switches).
Textbook	W. Kleitz, <i>Digital Electronics - A Practical Approach</i> , Prentice Hall, Current Edition.
Course Objectives	<p>This course will provide a comprehensive understanding of the principles and practices of digital logic circuits. Students should be able to analyze, design and implement combinational and sequential circuits.</p> <p>The laboratory sessions form an integral part to provide practical experiences in hardware and software analysis and design.</p>
Course Outcomes	<p>On successful completion of this course, students should be able to:</p> <ol style="list-style-type: none">1. Understand the basic characteristics of integrated-circuit logic devices (1).2. Analyze and simply combinational logic circuits (1).3. Design combinational logic circuits with building blocks such as adders, encoders, decoders, multiplexers and demultiplexers (2).4. Understand the operations of flip-flops and use timing waveforms to analyze sequential logic circuits (1).5. Design sequential logic circuits(2).6. Realize, test, and debug practical digital circuits (6).7. Use programmable logic devices and computer aided design (CAD) tools to design digital circuits (7).

8. Present lab results effectively in forms of lab reports (3).

Lecture Topics

1. Number systems and codes
2. Digital electronic signals and switches
3. Basic logic gates
4. Programmable logic devices
5. Boolean algebra and reduction techniques
6. Timing hazards
7. Exclusive-OR and Exclusive-NOR gates
8. Arithmetic operations and circuits
9. Code converters, multiplexers, and demultiplexers
10. Logic families and their characteristics
11. Flip-flops and registers
12. Practical considerations for digital design
13. Counter circuits
14. Shift registers
15. Synchronous sequential state machines

Computer Usage

High

Laboratory Experience

High

Design Experience

High

Coordinator

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Date

09/15/2018