ECE 270 Course Syllabus

Instructors:

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Course Web Site URL: https://engineering.purdue.edu/ece270

- materials covered on the first day of class are available on the Course Documents *page*

Course E-mail Address: ece270@ecn.purdue.edu (*please send all correspondence concerning ECE 270 to this address)*

Course Text: *Digital Design Principles and Practices (5th Ed.)*, John Wakerly, ISBN 978-013446009

Materials Required for Purchase: In addition to the course text listed above, you will need to purchase the following materials:

- **iClicker** Student Response Unit (available at bookstores – register on Blackboard)
- **Master Parts Kit** (available at http://www.elexp.com/pur_ece270_362.aspx) – *only needed if you have not previously purchased the kit for another ECE lab course*

Learning Outcome	***Lecture and Lab Topics***
1. An ability to analyze and design CMOS logic gates (8 lectures)	Number systems, base conversion, switching algebra, basic electronic components and concepts, logic signals, CMOS logic circuits, logic levels and noise margins, current sourcing and sinking, transition time, propagation delay, power consumption and decoupling, Schmitt triggers, transmission gates, three-state and open-drain outputs
2. An ability to analyze and design combinational logic circuits (8 lectures)	Combinational circuit analysis and synthesis, mapping and minimization, timing hazards, XOR/XNOR functions, programmable logic devices, hardware description languages, combinational building blocks: decoders, encoders, and multiplexers
3. An ability to analyze and design sequential logic circuits (9 lectures)	Bi-stable elements, set-reset and data latches, data and toggle flip-flops, state machine structure and analysis, clocked synchronous state machine synthesis, state machine design examples: sequence generators, counters and shift registers, and sequence recognizers
4. An ability to analyze and design computer logic circuits (11 lectures)	Signed number notation; radix addition and subtraction; adder, subtractor, and comparator circuits; carry look-ahead adder circuits; multiplier circuits; BCD adder circuits; simple computer top-down specification, instruction execution tracing, bottom-up realization, basic extensions, and advanced extensions
5. An ability to realize, test, and debug practical digital circuits (13 lab experiments)	Demonstration of Basic Logic Functions, Measurement of Gate Electrical Characteristics, Measurement of Gate Timing Characteristics, Implementation of Dual and Complement Functions, Investigation of Timing Hazards, Introduction to ispLever™ and Programmable Logic Devices, 7-Segment Alphanumeric Decoder, Introduction to Sequential Circuits, Introduction to ispMACH Development Board, Scrolling 7-Segment Display, Digital Combination Lock with Pseudo-Random Combination, Arithmetic Circuit, Simple Computer