Course Syllabus	**EECS 3400 – Electronics I**
Credits & Contact Hours	4 credit hours & 150 minutes lecture plus 2.5 hours of lab contact per week.
Coordinator	Dr. Weng L. Kang
Textbook	Richard Jaeger and Travis Blalock, "Microelectronic Circuit Design," 4th edition © 2011, McGraw Hill, ISBN 978-0-07-338045-2.
Course Information	Large signal and incremental characteristics of the pn diode, BJT, MOSFET and JFET: Large signal analysis and computer simulation of devices and digital circuits; Logic gate implementation; Laboratory experiments and projects. Prerequisites: EECS 2300 Required course
Specific Goals- Student Learning Objectives (SLOs)	The students will be able to 1. Apply the large signal method of analysis to electronic circuits that contain nonlinear circuit elements: diodes, FETs and BJTs. 2. Apply the SPICE simulation method of analysis to electronic circuits that contain nonlinear circuit elements: diodes, FETs and BJTs. 3. Design FET and BJT inverter circuits with a required noise margin and fan-out, inverters of minimum size, with equal rise and fall times, and with specified logic threshold voltage value. 4. Explain the tradeoffs for lowering power dissipation in digital electronic circuits. 5. Analyze combinational logic circuits to determine the Boolean function implemented by the circuit. 6. Design combinational static CMOS gates so that they implement a desired Boolean function, and to design the transistor aspect ratios so that the CMOS gate has the same rise and fall times as the reference inverter. 7. Give examples of the three established principles of encoding the logic/numeric values in memory cells: by the state of a bistable circuit, by an electrical charge on a capacitance, and by a FET's threshold voltage value.

8. State the challenges and the complexity tradeoffs in the design of modern memory arrays.
9. State the design principles used in legacy TTL and ECL integrated circuits.
10. Conduct experiments in order to collect, analyze, and interpret data.
11. Explain the properties of semiconductor materials and the mechanisms of charge transportation in the semiconductor materials.
12. Design an experiment to measure the propagation delay of representative of two families of widely used digital logic gates (4xxx series CMOS and 74LSxx series TTL).
13. Function effectively on a team with effectiveness being determined by as documented in lab reports, instructor observations, and peer ratings.

Topics

1. Introduction to Electronics
2. Solid State Electronics
3. Diodes and Diode Circuits
4. Field Effect Transistors (JFET, MOSFET)
5. Bipolar Junction Transistors (BJT)
6. Intro to Digital Electronics
7. CMOS Logic Design
8. MOS Memory and Storage
9. Bipolar Logic Circuits