EEE 334 Circuits II (4) [S]

Course (Catalog) description:
Application of electric network theory to semiconductor electronics. Design of analog and digital circuits. Diodes and MOSFETS. Digital and analog circuit building blocks. Fundamentals of mixed signal circuits.
Lecture, Lab. Required.

Pre-requisites:
Engineering BS/BSE student and a grade of D or better in ECE201 or EEE202

Textbook:
A.S. Sedra and K.C. Smith, *Microelectronic Circuits*, Seventh Edition, Oxford University Press.

Supplemental Materials:
M.E. Herniter, Schematic Capture with Microsim™ PSpice, Prentice Hall, 2002

Coordinator:
Dr. Junseok Chae

Prerequisites by Topic:
Electrical network theory

Course Objectives:
Application of electric network theory to analysis and design of the fundamental non-linear circuits of transistor electronics.

Course Outcomes:
1. Apply electric network theory to semiconductor circuits containing diodes, transistors, operational amplifiers and digital logic gates.
2. Learn to distinguish DC bias from small-signal analysis
3. Analyze basic diode circuits
4. Understand basic analog MOS circuits
5. Learn topology and operation of CMOS digital gates
6. Understand topology, operation and applications of current mirrors and active load circuits

Course Topics:
1. Amplifiers, Op Amps
2. Diodes and diode circuits
3. MOS devices
4. Current mirrors and active load circuits
5. CMOS digital circuits

Computer Usage:
Schematic and Layout Entry/Verification: Cadence. Simulations: Spectre, Nanosim

Laboratory Experiments:
Students meet weekly for a three-hour laboratory under the guidance of a TA. Experiment topics are:

Operational amplifiers
PN junction diodes
MOS characterization
Single stage MOS Amplifiers
Introduction to digital circuits

Assessment:
Through homeworks, quizzes, Midterm tests, Lab, final exam.

Course Contribution to Engineering Science and Design:
EEE334 contributes to engineering science through linear and non-linear circuit analysis, problem solving, computer simulations and synthesis of device physics and circuit analysis for the purpose of integrated circuit design.

Course Relationship to Program Outcomes:
a: "Fundamentals of integrated circuit design" is a marketable skill essential for students who will specialize in circuit design as well as for those who will go into technical sales and related areas. This course also provides a solid foundation for further engineering education and additional training in applications of the mathematical techniques of the electrical network theory.
e: During both the instruction and the lab the students study problems in the circuit area that are both open-ended and more complex.
k:Students also use circuit simulator and modern laboratory equipment.

Person preparing this description and date of preparation: Gennady Gildenblat, September 10, 2008, J. Chae, K. Tsakalis, June 2015.