ECE720   **Low-Power Mixed-Signal VLSI Design.**

Objectives: Students learn to navigate Analog Design IC textbooks using a bottom-up and a top-down design view of MIxed Signal Electronic Systems, and are given a design problem requiring use of modern Computer Aided Design (CAD) tools.

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Texts: Analog Integrated Circuit Design by Johns & Martin   2nd ed. (or 1st ed.)
           Microelectronic Circuits by Sedra & Smith (undergrad microelectronics)

1A. Introduction, Course Plan, Overview of mixed signal SYSTEM design flow with data converters, review inverter.   Notes from other electronics courses, Razavi textbook - chp. 1

1B. Overview of the Analog IC Design Textbooks: devices, layout, components, inverters, op amps, voltage references, comparators, sample & holds, data converters, filters, plls.

2A. Transistor amplifier modeling strategies - Nonlinear, but use linearization (small signal)
           Mainly MOS Transistor modeling, some BJT similarities   chps. 1, 3, 4, 8 - skim

2B.   CMOS fabrication and layout summary   chp 2 - skim
           Compare/contrast digital vs. analog chp. 2, ece721

3. Inverters, Differential Amplifiers, Current Mirrors & biasing.   chp. 3, 4, 6
                 Canonical MOS Differential Pair with active load.

4A. Data Converter Fundamentals -
                 Key concepts for describing data converter attributes.   chp. 15

                              Midterm

4B. Data Converter Modules - Nyquist rate D/As and A/Ds   chps. 16, 17

5. CMOS Operational Amplifiers, frequency compensation   chp. 5, 6

6A.   Overview of noise considerations and modeling   chp. 9
6B. Voltage References , Comparators, Sample & Holds   chps. 7, 10, 11
6C. Discrete time and Switch Cap Circuits.   chps. 13, 14
6D. Data Converter Modules -   Oversampling A/Ds   chps. 18

Grading:	First Exam	30-35%	(~week 6)
	Final Exam	35%	9:30am Wed. Mar. 14
	Design Project	15%	Due Finals Week
	Homework & Quizzes	15-20%	Anytime

Homework is graded as much on effort (on time, neatness, organized) as it is on correctness.

All students are rank ordered in assigning final grades.