EEL 6935: ANALOG SIGNAL PROCESSING FALL 2003

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Corequisite: EEL5320 or equivalent Class Meeting: MWF 3rd period (9:35-10:25am) in Lar 239 Class Homepage: http://www.cnel.ufl.edu/hybrid/courses/EEL6935

Required Textbooks:

Analog VLSI: Circuits and Principles by S. Liu, J. Kramer, G. Indiveri, T. Delbrck, and R. Douglas Publisher: MIT Press, 2002, ISBN: 0262122553

Analog VLSI and Neural Systems, by C. Mead, Addison-Wesley, 1989, ASIN: 0201059924. Since the book is out of print, copies of select chapters are available for \$14 from Target Copy (22 NW 13th St, 376-3826).

Course Overview: Biological sensory processing systems are used to motivate the development of analog circuit models of information processing in the brain. Subthreshold CMOS circuit designs are considered in detail for the design of vision, auditory and neural processing systems. Besides modelling neurobiology, such hardware can lead to viable commercial products since real-world signal processing systems must interface with the fundamentally analog world. There is much that can be accomplished in ultra-low power analog circuitry before conversion to the digital domain. A key theme throughout the course will be the powerful role of timing for signal representation and communication in both neurobiology and engineering systems. System examples include silicon and biological neurons, auditory system modelling, CMOS imagers and sigma-delta converters.

Course Topics:

Below- and above-threshold MOSFET characteristics, noise and offset considerations.

Basic computational building blocks (voltage- and current-mode)

Physics of computation, ultra-low power processing

Adaptive systems and floating-gate circuits

Silicon/biological neurons, signal representation and computation

Auditory system modelling (preprocessing, feature extraction and recognition)

Visual system (state-of-the-art CMOS imagers, integrated visual processing chips)

Interfaces to the digital world, sigma-delta converters

Tentative Grade Determination:

25% Homework
25% Exam 1
25% Exam 2
25% Final project