# EEL 6935: ANALOG SIGNAL PROCESSING FALL 2002

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**Prerequisite:** Basic courses in electronics and signals & systems
**Class Meeting:** MWF 6th period (12:50-1:40am) in EB 201
**Class Homepage:** http://www.cnel.ufl.edu/hybrid/courses/EEL6935

**Required Textbook:** Analog VLSI : Circuits and Principles by Shih-Chii Liu (Editor), MIT Press; ISBN: 0262122553. Preprints of chapters 3, 5 and 6 will be available at the Target Copy Center (22 NW 13th St Gainesville, FL 32601 352-376-3826) until the book is published in early September.

**Recommended Books:**

- Analog VLSI and Neural Systems, by C. Mead, Addison-Wesley, 1989, ASIN: 0201059924.
- Analog Integrated Circuit Design by David Johns and Ken Martin, John Wiley & Sons; ISBN: 0471144487.

**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 also lead to economical commercial products since real-world signal processing systems must interface with

the fundamentally analog world. There is much that can be done in the continuous-time analog realm before conversion to the digital domain. A key theme throughout the course will be the surprisingly ubiquitous role of digital pulses 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:**

30% Homework
20% Exam 1
20% Exam 2
30% Final project

**Key Dates:**

October 2, period E1-E2, room TBA.
November 6, period E1-E2, room TBA.
Final project due Dec 11, 5pm.