ESE 517
Integrated Electronic Devices and Circuits II

Spring 2008

Stony Brook University
Department of Electrical and Computer Engineering

Course Description
This is an advance, project oriented, integrated circuit design class. The various practical aspects of analog and mixed-signal circuit design, like structured design, scalability, parallelism, low-power consumption, and robustness to process variations, will be covered. Topics considered will include design of digital-to-analog and analog-to-digital data converters, delta-sigma modulation, filters, imagers, bioinstrumentation and adaptive neural computation.

Classes : Th, 6:50-9:50pm
Office hours : TuTh 11:00am-1:00pm, or by appointment

Instructor : Milutin Stanacevic
Office : 263 Light Engineering
Email : milutin@ece.sunysb.edu

Text Book:
Class Handouts and Technical Papers.

References :
D.A. Johns and K. Martin, "Analog Integrated Circuit Design", 1st edition, Wiley 1996.
B. Razavi, "Design of Analog CMOS Integrated Circuits"
P.R. Gray, P.J. Hurst, S.H. Lewis, and R.G. Meyer , "Analysis and Design of Analog Integrated Circuits"
J.E. Franca and Y. Tsividis, Eds. "Design of Analog-Digital VLSI Circuits for Telecommunications and Signal Processing"

Suggested Reading: (or browsing, for project ideas)
1. IEEE Journal of Solid-State Circuits
2. IEEE Transactions on Circuits and Systems I
3. IEEE Transactions on Neural Networks: special issues on neural hardware

Grading
A. Research Paper Presentation
Each student will make a presentation based on an assigned research paper. These presentations will be scheduled during the lectures, in the second part of the semester, and they will be 30 minute long each. The presentation will count with 20% in the final grade.

B. Class Project

The students would organize themselves into groups, each comprising of 2 or 3 members. The group will schedule meeting hour (1 hour per week) with the instructor to discuss project issues. The topics for the project would be from the following areas: biomedical signal processing and acquisition, smart imagers, speech processors and sensory systems.

- Group formation and definition due Week 3
- Project proposal due Week 5
- Project presentation I due Week 10
- Final presentation due Week 13

Course Schedule

Week 1,2	Analog-to-digital Nyquist-rate converters.
Week 3	Digital-to-analog Nyquist-rate converters.
Week 4	Delta-sigma modulation.
Week 5	Power estimation and optimization. Biasing and voltage references.
Week 6	Low-voltage and low-current analog design.
Week 7	Switched current circuits.
Week 8	Analog computation blocks.
Week 9	Biomedical instrumentation.
Week 10	Project presentations.
Week 11	Learning on silicon.
Week 12	Technical paper study.
Week 13	Project presentations.