

EEE 296Q – Mixed-Signal Integrated Circuit Methodology Laboratory

Elective Laboratory

Date: 2/28/07

Microelectronic Design area

Course Coordinators: Perry L Heedley and Thomas W Matthews

Catalog Description:

This laboratory covers the methodology needed to develop successful mixed-signal integrated circuits using a professional style design flow and computer-aided design tools. Students will learn proven design techniques and gain hands-on experience by designing their own integrated circuit. Good communication skills will also be developed as students give periodic presentations of their work to their peers and advisors. This includes reviews for the architecture, design and layout of their circuits. 1 unit.

Prerequisites: EEE 230 or consent of the instructor.

Text: Methodology guideline documents developed by Perry Heedley in cooperation with industry experts.

Additional Resources: Mentor Graphics computer-aided design reference manuals (available on-line).

Course Objectives:

Each student will chose a mixed-signal circuit block to design and layout, with instructor approval. Their work in this lab will focus on the design and layout of this circuit according to the methodology described in lab discussions and in the guideline documents, using the Mentor Graphics CAD tools. The goal of each student is to complete their design and have a silicon IC fabricated to test it. Through this experience students will learn proven mixed-signal design techniques and gain hands-on experience by designing their own integrated circuit. Good communication skills will also be developed as students give periodic presentations of their work to their peers and advisors.

Prerequisites by Topic:

1. Integrated circuit devices and models
2. Single-stage and differential amplifiers
3. Current sources and active loads
4. Operational amplifiers, including frequency response and compensation
5. Feedback concepts, including the use of ideal op amps

Topics Covered:

1. Use of a professional style methodology to design mixed-signal integrated circuits
2. Use of industry standard computer-aided design tools to design and layout integrated circuits
3. How to give professional style peer reviews for the architecture, design and layout of their circuits

Evaluation: Students will give periodic presentations of their work, including reviews for the architecture, design, and layout of their circuits. These will be graded against a checklist of expectations provided to the students in advance, with each review contributing an equal amount towards the final grade for the laboratory.

EEE 296Q Course Outline/Schedule

<u>Week</u>	<u>Topics</u>
1-2	Mixed-signal methodology is presented; individual projects are defined and students begin a literature search on their circuit block
3	Schematic capture and simulation using Mentor Graphics CAD flow presented
4	Architecture reviews presented by students; design of circuits begins
5-9	Design of circuits proceeds, followed by presentation of design reviews
10	Layout using Mentor Graphics CAD flow presented
11-14	Layout of circuits proceeds
15	Presentation of layout reviews