**The University of Texas at Tyler**
**Department of Electrical Engineering**

## Course: EENG 4339–CMOS Analog Integrated Circuits (Elective)

## Syllabus

Catalog Description:

CMOS device characteristics, fabrication, and modeling; CMOS analog subsystems (switches, current sources, and voltage references), amplifiers, and voltage comparators.

Prerequisites: EENG 4309, EENG 4109

Credits: ( 3 hours lecture, 0 hours laboratory per week )

Text(s): Behzad Razavi, *Design of Analog CMOS Integrated Circuits*
ISBN-13 978-0-07-238032-3

Additional Material: Access to PSpice

Course Coordinator: David M. Beams

Topics Covered: (paragraph of topics separated by semicolons)

1. CMOS device electrical characteristics;
2. CMOS fabrication processes;
3. Modeling of MOS devices;
4. CMOS switches;
5. MOS voltage references;
6. MOS current sources and current mirrors;
7. CMOS amplifiers and operational amplifiers.

Evaluation Methods: (only items in dark print apply):

1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Objectives[1]: By the end of this course students will be able to:

1. Describe the *I-V* characteristics of MOS transistors operating in triode and saturation regions [2];
2. Describe the processing steps in the fabrication of CMOS devices [2];
3. Model MOS devices operating in both triode and saturation regions[2];
4. Design CMOS analog switches [2];
5. Analyze and design CMOS voltage references [2];
6. Analyze and design CMOS current sources and current mirrors [2];
7. Analyze and design CMOS operational amplifiers [2];

[1] *Numbers in brackets refer to method(s) used to evaluate the course objective.*

Relationship to Program Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering **(2) [1-7]**;
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering **(2) [3-7]**;
3. have the ability to analyze electrical circuits, devices, and systems **(3) [5-7]**;
4. have the ability to design electrical circuits, devices, and systems to meet application requirements **(3) [4-7]**;
5. have the ability to design and conduct experiments, and analyze and interpret experimental results;
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods;
7. have effective written, visual, and oral communication skills;
8. possess an educational background to understand the global context in which engineering is practiced, including:
   a. knowledge of contemporary issues related to science and engineering;
   b. the impact of engineering on society;
   c. the role of ethics in the practice of engineering;
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams;
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.

[2] *Numbers in parentheses refer to the degree to which this course supports the listed Electrical Engineering Program Outcome. 1=minor support; 2=significant support; 3=major support. Numbers in brackets refer to course objective(s) that address the Program Outcome.*

Contribution to Meeting Professional Component: (in semester hours)

| | | |
|---|---|---|
| Mathematics and Basic Sciences: | 0 | hours |
| Engineering Sciences and Design: | 3 | hours |
| General Education Component: | 0 | hours |

Prepared By: David M. Beams Date: 30 Aug 2010