

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

EENG 5340: Advanced Topics in EE: Analog CMOS Design

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: Journal articles, Access to PSpice

Course Coordinator: David Beams, Associate Professor, Electrical Engineering

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 Objectives¹: 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 [2,3,6];
2. Describe the processing steps in the fabrication of CMOS devices [2,3,6];
3. Model MOS devices operating in both triode and saturation regions [2,3,6];
4. Design CMOS analog switches [2,3,6];
5. Analyze and design CMOS voltage references [2,3,6];
6. Analyze and design CMOS current sources and current mirrors [2,3,6];
7. Analyze and design CMOS operational amplifiers [2,3,6];

¹Numbers 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. Possess a breadth and depth of knowledge in electrical and computer engineering. Students will possess and be able to apply knowledge and principles at a graduate level in two or more of the following areas utilizing modern engineering tools: electronics, power systems, controls, advanced engineering mathematics, signal processing, communications, real-time systems, computer systems, electromagnetic and power electronics. [1, 2, 3, 4, 5, 6, 7]
2. Possess and demonstrate oral and written communication skills: Students will be adequately prepared for entrance into advanced careers or into a doctoral program through reports, papers, publications, or presentations. [1, 2, 3, 4, 5, 6, 7]
3. Demonstrate the capability to perform independent learning and investigation: Students will successfully address electrical or computer engineering problems through independent research activity in coursework or a thesis. [1, 2, 3, 4, 5, 6, 7]

²Numbers in brackets refer to course objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

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

Prepared By: David Beams

Date: 30 Aug 2010