

SYLLABUS ECE 5020: Mixed Signal VLSI

Autumn 2018

Description: Design and circuit analysis of basic VLSI structures such as registers, cell libraries, memory, digital and analog I/O. Students will be introduced to schematic capture, simulations, timing analysis and physical layout using cadence design tools. There will be an emphasis on CMOS circuit design, culminating in a design project.

Learning Goals:

1. Introduce students to the detailed design of VLSI circuits
2. Use VLSI computer aided design tools
3. Complete a design project using the concepts learned in class Student

Instructor:

Tawfiq Musah
316 Dreese Lab
musah.3@osu.edu

Text:

Required: *Digital Integrated Circuits, 2nd Edition*, Rabeay, Chandrakasan, Nikolic, Prentice Hall, 2003.

References (supplemental reading):

CMOS VLSI Design A Circuits and Systems Perspective, 4th Edition, by N. Weste and D. Harris, Addison-Wesley, 2011.

Topics and Tentative Number of Lectures:

Introduction
MOS Transistor
The CMOS inverter
Combinational logic structures
Sequential logic gates
Design methodologies
Interconnect: R, L and C
Timing Analysis
Arithmetic building blocks
Memory and array structures

Grading:

Midterm Exam	25%
Design Project	20%
Final Exam	35%
Homework & Quizzes	20%

Homework: Homework problems will be assigned throughout the semester, and may include design and simulations in cadence tools. Students are encouraged to work in teams on the homework design problems, but each person should submit an individual report.

Homework Quizzes: As/when needed. These will be 15 minutes closed book/closed note single-problem quiz, sparsely distributed throughout the semester. There will be an announcement ahead of all quizzes.

Midterm Exam: The exam will be closed book. No internet-enabled devices are permitted. Calculators may or may not be allowed. No working with others. The exam is scheduled for **Wednesday 10th October, 2018** in class.

Missed exams: Any missed exam will result in a zero grade unless arrangements are made in advance. Suitable circumstances include illness, death in the immediate family, and situations of comparable gravity. In such cases, *if and only if arrangements are made in advance*, a make-up exam can be arranged. Midterms dates are announced well in advance, so plan your job interviews and such around them.

Office hours: I will hold office hours on Mondays 1:00-2:30 and Thursdays 1:00-2:30.

Reaching me: You may reach me during office hours, or make an appointment by email if you cannot make my office hours. **Please do not "drop by" without an appointment.**

FINAL EXAM: Our final exam will be **Thursday, December 13, from 4:00pm-5:45pm**. No make-up or early exams allowed.

Disabilities Statement

Any student who feels s/he may need an accommodation based on the impact of a disability should contact the instructor privately to discuss specific needs. Please contact the OSU Office for Disability Services for assistance in verifying the need for accommodations and developing accommodation strategies. If you require

accommodation, please let the instructor know at the beginning of the term, and not later than the second Friday, so that if arrangements are needed regarding midterms, there will be time to set them up.

Academic Misconduct Statement

Any student found to have engaged in academic misconduct, as set forth in the Code of Student Conduct Section 3335-23-04, Prohibited Conduct, will be subject to disciplinary action by the university. Academic misconduct is any activity that tends to compromise the academic integrity of the university, or subvert the educational process.

Student Conduct

Students are expected to abide by the provisions in the Code of Student Conduct. The University's [Code of Student Conduct](#) and [Sexual Harassment Policy](#) are available on the OSU Web page

Student Counseling and Consultation Services

As a student you may experience a range of issues that can cause barriers to learning, such as strained relationships, increased anxiety, alcohol/drug problems, feeling down, difficulty concentrating and/or lack of motivation. These mental health concerns or stressful events may lead to diminished academic performance or reduce a student's ability to participate in daily activities. The Ohio State University offers services to assist you with addressing these and other concerns you may be experiencing. If you or someone you know are suffering from any of the aforementioned conditions, you can learn more about the broad range of confidential mental health services available on campus via the Office of Student Life's Counseling and Consultation Service (CCS) by visiting ccs.osu.edu or calling [614-292-5766](tel:614-292-5766). CCS is located on the 4th Floor of the Younkin Success Center and 10th Floor of Lincoln Tower. You can reach an on call counselor when CCS is closed at [614-292-5766](tel:614-292-5766) and 24 hour emergency help is also available through the 24/7 National Suicide Prevention Hotline at 1-800-273-TALK or at suicidepreventionlifeline.org.