

ECE 5020 (Proposed): Mixed Signal VLSI

Course Description

Design and circuit analysis of basic VLSI structures such as registers, cell libraries, digital and analog I/O. Physical layout, timing analysis, PLLs, design tools.

Prior Course Number: 721

Transcript Abbreviation: Mixed Signal VLSI

Grading Plan: Letter Grade

Course Deliveries: Classroom

Course Levels: Undergrad, Graduate

Student Ranks: Senior, Masters, Doctoral

Course Offerings: Autumn

Flex Scheduled Course: Never

Course Frequency: Every Year

Course Length: 14 Week

Credits: 3.0

Repeatable: No

Time Distribution: 3.0 hr Lec

Expected out-of-class hours per week: 6.0

Graded Component: Lecture

Credit by Examination: No

Admission Condition: No

Off Campus: Never

Campus Locations: Columbus

Prerequisites and Co-requisites: Prereq: 3020 (323), or Grad standing in Engineering, Biological Sciences, or Math and Physical Sciences.

Exclusions: Not open to students with credit for 721.

Cross-Listings:

Course Rationale: Existing course.

The course is required for this unit's degrees, majors, and/or minors: No

The course is a GEC: No

The course is an elective (for this or other units) or is a service course for other units: Yes

Subject/CIP Code: 14.1001

Subsidy Level: Doctoral Course

Programs

Abbreviation	Description
CpE	Computer Engineering
EE	Electrical Engineering

Course Goals

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

Course Topics

Topic	Lec	Rec	Lab	Cli	IS	Sem	FE	Wor
Design flow and project planning	4.0							
CMOS circuit and logic design	6.0							
MOS transistor equations and circuit performance characterization - speed, power, reliability.	8.0							
CMOS fabrication, design rules, and physical layout	6.0							
Use of CAD tools, circuit simulation techniques	5.0							
System design, array subsystems, special purpose systems - clocking, I/O pads, analog	10.0							

Representative Assignments

Homework
Design project with CAD tools

Grades

Aspect	Percent
Homework and Quizzes	15%
Exam I	30%
Design Report	20%
Final Exam	35%

Representative Textbooks and Other Course Materials

Title	Author
<i>Digital Integrated Circuits</i>	Rabeay, Chandrakasan, Nikolic

ABET-EAC Criterion 3 Outcomes

Course Contribution		College Outcome
***	a	An ability to apply knowledge of mathematics, science, and engineering.
*	b	An ability to design and conduct experiments, as well as to analyze and interpret data.
***	c	An ability to design a system, component, or process to meet desired needs.
	d	An ability to function on multi-disciplinary teams.
*	e	An ability to identify, formulate, and solve engineering problems.
	f	An understanding of professional and ethical responsibility.
	g	An ability to communicate effectively.
	h	The broad education necessary to understand the impact of engineering solutions in a global and societal context.
*	i	A recognition of the need for, and an ability to engage in life-long learning.
	j	A knowledge of contemporary issues.
**	k	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Additional Notes or Comments

Updated prereqs and exclusion to match university version.

Change text to Rabway et all 4/7/2016 BLA

Edited text info, 5/10/17, CED

Prepared by: Carol Duhigg