	COURSE CHANGE REQUEST **Undergraduate Programs**	UUPC Approval _3-28-22_
FAU **FLORIDA ATLANTIC UNIVERSITY**	**Department** Electrical Engineering and Comp Science	UFS Approval _____ SCNS Submittal _____ Confirmed _____ Banner Posted _____ Catalog _____
	College Engineering and Computer Science	

Current Course **Prefix and Number**	CDA 4210	*Current* Course Title Introduction to VLSI

*Syllabus must be attached for **ANY** changes to current course details. See Checklist. Please consult and list departments that may be affected by the changes; attach documentation.*

Change title to:	**Change description to:**
Change prefix	
From: **To:**	
Change course number	**Change prerequisites/minimum grades to:**
From: **To:**	CDA 3203 AND EEE 3300 with the minimm grade of C, or instructor's approval
Change credits*	
From: **To:**	
Change grading	**Change corequisites to:**
From: **To:**	
Change WAC/Gordon Rule status** Add ☐ Remove ☐	**Change registration controls to:**
Change General Education Requirements* Add ☐ Remove ☐ *Review Provost Memorandum **WAC/Gordon Rule criteria must be indicated in syllabus and approval attached to this form. See WAC Guidelines. ***General Education criteria must be indicated in syllabus and approval attached to this form. See GE Guidelines.	Please list existing and new pre/corequisites, specify AND or OR and include minimum passing grade (default is D-).

Effective Term/Year for Changes: Fall 2022	**Terminate course? Effective Term/Year for Termination:**

Faculty Contact/Email/Phone Hanqi Zhuang, zhuang@fau.edu, 561-297-3413

Approved by		*Date*
Department Chair		2/18/22
College Curriculum Chair	Hongbo Su *Digitally signed by Hongbo Su DN: CN=Hongbo Su, O=FAU, OU=FAU, E=suh@fau.edu, C=US Reason: I am the author of this document Location: your signing location here Date: 2022.03.16 11:24:23-04'00' Foxit Reader Version: 10.1.1*	
College Dean		3/17/22
UUPC Chair	Ethlyn Williams	3-28-22
Undergraduate Studies Dean	Dan Meeroff	3-28-22
UFS President		
Provost		

Email this form and syllabus to mjenning@fau.edu seven business days before the UUPC meeting.

CDA-4210 (001 CRN 19284, 002 CRN 19285)
Introduction to VLSI Design
WF 2:00 – 3:20
3 credits

Spring, 2022
Prof. Ankur Agarwal
Office: EE-521
Office hours: WF 11:00-1:00
Classroom: CM-125
Telephone: 561-297-3496
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TA name   Harshal Sanghvi
Office
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Course Description

The purpose of this course is to develop an understanding of digital VLSI systems, which include device types, 3-D models, CMOS Technology, Design rules and diagrams, Fabrication processes and techniques, and Layout Design and Analysis. Other VLSI design technologies will be discussed such as NMOS, Dynamic CMOS and transfer gate among others. Students will have several hands-on experiments and design assignments.

Instructional Method

This class is a recorded live and students may attend in person. Other students will view class sessions remotely in Canvas. You must log into Canvas with your FAU ID and Password to access the materials and assignments in this course. If you do not know your FAU ID or Password, contact OIT for help.

The course is organized into modules with due dates. Dates and durations for each module may vary so please pay close attention to start and due dates. Generally, due dates will overlap with other modules so please pace yourself appropriately. You can access a course schedule via Canvas within the Syllabus tab of the course – subject to change.

COVID-19 Statement

Due to the surge in COVID-19 cases and the omicron variant, all students regardless of vaccination status are expected to wear masks while indoors in any FAU facilities, including classrooms and laboratories. Students experiencing flu-like symptoms (fever, cough, shortness of breath) or students who have come in contact with confirmed positive cases of COVID-19 should immediately contact FAU Student Health Services (561-297-3512). Symptomatic students will be asked to leave the classroom to support the safety and protection of the university community. For additional information visit www.fau.edu/coronavirus. In classes with face-to-face components, quarantined students should notify me immediately as you will not be able to attend class. I will not be able to offer an online version of the class but will make reasonable efforts to assist students in making up the work.

Prerequisites/Corequisites
CDA 3203 AND EEE 3300, or instructor's approval

Course Objectives/Student Learning Outcomes
Program Outcome 1: (Proficiency in the areas of electronics, computer architecture and computer design)

Program Outcome: An Ability to identify, formulate, and solve complex computing/engineering problems by applying principles of computing, engineering, science, and mathematics. (Problem solving)

Program Outcome 3: (An ability to plan and execute an engineering design to meet an identified need)

Program Outcome 5: An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, creates a collaborative and inclusive environment and engages in activities appropriate to the program's discipline. (Teamwork)

All the students are required to have a computer access with Internet. Students may require an external speaker phone/headphone, microphone and a camera.

There will be 4 lab assignments in this course. The instructor would provide the access to the software to all the students for downloading and installing it on their computers. The instruction for software installation would be attached on the blackboard site.

The course is divided into two sections: theoretical component and lab component. 50% of the lectures will be utilized towards the lab component. One to one meeting will be scheduled with the instruction and TA and some lectures will be utilized for such meeting to help the student complete the lab work.

This course has no coding content.

Course Evaluation Method

Home Work	-	5%
Laboratory Experiments and Report	-	40%
Mid Term Exam	-	25%
Final Examination	-	30%

DISCLAIMER: PLEASE NOTE THAT THE INSTRUCTURE MAY CHAGE SOME OF THE ASSESSMENT BY INCREASING OR REDUCING THE ASSIGNMENTS OR QUIZES BASED ON THE OVERALL PROGRESS OF THE ENTIRE CLASS GROUP. FURTHER THERE COULD BE A CURING OF THE GRADES BASED ON THE FINAL STUDENT RESULTS AND OUTCOMES

Course Grading Scale

90 and above: "A",
87-89:   "A-",
83-86:   "B+",
 80-82:   "B",
77-79 :   "B-",
73-76:   "C+",
70-72:   "C",
67-69:   "C-",
And below: "F."

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Policy on Makeup Tests, Late Work, and Incompletes (if applicable)

Late work is not acceptable. All projects will have a due date and a Final due date, assignments will be posted well in advance and students may submit assignments early. No assignments will be accepted after the Final due date.

MAKE-UP POLICY FOR TESTS Makeup test is given only if there is solid evidence of a medical or otherwise serious emergency that prevented the student of participating in the exam.

INCOMPLETE GRADE POLICY Incomplete grades are against the policy of the department. Unless there is solid evidence of medical or otherwise serious emergency and the student is currently passing the class, incomplete grades will not be given.

Special Course Requirements (if applicable)

Hardware & Software Requirements

Hardware

- Dependable computer
- Computer speakers
- Headset with microphone
- Webcam
- Printer
- Printer paper
- Ink
- Scanner

Software

- [Microsoft 365 Suite](#)
- Reliable web browser (recommended [Chrome](#) or [Firefox](#))
- Canvas mobile app: Download instructions for [iOS device](#) or [Android device](#)
- [Adobe Reader](#)
- [Adobe Flash Player](#)

Internet Connection

- Recommended: Broadband Internet connection with a speed of 4 Mbps or higher.
- To function properly, Canvas requires a high-speed Internet connection (cable modem, DSL, satellite broadband, T1, etc.). The minimum Internet connection speed to access Canvas is a consistent 1.5 Mbps (megabits per second) or higher.
- [Check your Internet speed here.](#)

Classroom Etiquette Policy (if applicable)

University policy requires that in order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular phones and laptops, are to be disabled in class sessions other than the time periods when the students will be directly instructed to work on their computers.

Policy on the Recording of Lectures (optional)

Students enrolled in this course may record video or audio of class lectures for their own personal educational use. A class lecture is defined as a formal or methodical oral presentation as part of a university course intended to present information or teach students about a particular subject. Recording class activities other than class lectures, including but not limited to student presentations (whether individually or as part of a group), class discussion (except when incidental to and incorporated within a class lecture), labs, clinical presentations such as patient history, academic exercises involving student participation, test or examination administrations, field trips, and private conversations between students in the class or between a student and the lecturer, is prohibited. Recordings may not be used as a substitute for class participation or class attendance and may not be published or shared without the written consent of the faculty member. Failure to adhere to these requirements may constitute a violation of the University's Student Code of Conduct and/or the Code of Academic Integrity.

Attendance Policy

Students are expected to attend all of their scheduled University classes and to satisfy all academic objectives as outlined by the instructor. The effect of absences upon grades is determined by the instructor, and the University reserves the right to deal at any time with individual cases of non-attendance. Students are responsible for arranging to make up work missed because of legitimate class absence, such as illness, family emergencies, military obligation, court-imposed legal obligations or participation in University-approved activities. Examples of University-approved reasons for absences include participating on an athletic or scholastic team, musical and theatrical performances and debate activities. It is the student's responsibility to give the instructor notice prior to any anticipated absences and within a reasonable amount of time after an unanticipated absence, ordinarily by the next scheduled class meeting. Instructors must allow each student who is absent for a University-approved reason the opportunity to make up work missed without any reduction in the student's final course grade as a direct result of such absence.

Counseling and Psychological Services (CAPS) Center

Life as a university student can be challenging physically, mentally and emotionally. Students who find stress negatively affecting their ability to achieve academic or personal goals may wish to consider utilizing FAU's Counseling and Psychological Services (CAPS) Center. CAPS provides FAU students a range of services – individual counseling, support meetings, and psychiatric services, to name a few – offered to help improve and maintain emotional well-being. For more information, go to http://www.fau.edu/counseling/

Disability Policy

In compliance with the Americans with Disabilities Act Amendments Act (ADAAA), students who require reasonable accommodations due to a disability to properly execute coursework must register with Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses – Boca Raton, Davie and Jupiter – however disability services are available for students on all campuses. For more information, please visit the SAS website at www.fau.edu/sas/.

Code of Academic Integrity

Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty is considered a serious breach of these ethical standards, because it interferes with the university mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the university community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001.

Required Texts/Readings

Principles of CMOS VLSI Design, by N. Weste & K. Eshraghian, Addison-Wesley, 2nd ed. ISBN=0-201-53376-6

Supplementary/Recommended Readings (if applicable)

Course Topical Outline

- Technology Review, Trends, New Technologies, and Levels of Abstraction.
- Semiconductor Physics, P-Type, N-Type devices, Reverse Bias, Forward Bias.
- MOS Transistors characteristics, 3-D Models, and Regions of Operation.
- CMOS Technology, Static CMOS Circuits.
- Design Rules, Stick Diagram, and Complex Static CMOS Circuits.
- Dynamic CMOS Circuits Design.
- Fabrication Processes and Techniques.
- N-MOS Technology, Technologies Comparison.
- LAYOUT Design and Analysis.
- Test1# Week Six

- Final Exam: As assigned by the University schedule