

Digital Design

EEL 4712C

Class Periods: MWF, Period 2 (8:30 AM - 9:20 AM)

Location: MALA1000

Academic Term: Spring 2024

Instructor:

Dr, Christophe Bobda, cbobda@ece.ufl.edu, 352 294 2024

Class: MWF, Period 3, 09:35AM - 10:25AM,

Office Hours: MF, 12:00PM - 1-00PM:

Office: MALA 5007

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

- Teaching Assistant: Yu Feng

Peer Instructors (PI):

Name	Sarah Schultz (SS)	Mark Herring	Luke Saleh (LS)
e-mail	schultzsarah@ufl.edu	m.herring@ufl.edu	lukesaleh@ufl.edu
Name	James Wi (JW)	Zack Mendez (ZM)	Nathaniel Downes (ND)
e-mail	jwi@ufl.edu	zacharymendez@ufl.edu	nathanieldownes@ufl.edu
Name	John Baldwin (JB)		
e-mail	jaridcohen@ufl.edu		

Exercises/Lab Sections: Room NEB 248

Monday			Tuesday			Wednesday			Thursday			Friday		
Sec	Start	PI	Sec	Start	PI	Sec	Start	PI	Sec	Start	PI	Sec	Start	PI
	9:35 AM			9:35 AM			9:35 AM			9:35 AM	11430	9:35 AM	JB	
	11:45 AM			11:45 AM			11:45 AM			11:45 AM		11:45 AM		
	1:55 PM		11427	1:55 PM	JW	11431	1:55 PM	LS	11429	1:55 PM	JW	11433	1:55 PM	MH
11410	4:05 PM	SS	11426	4:05 PM	ND	11428	4:05 PM	ZM	11453	4:05 PM			4:05 PM	
11411	6:15 PM	SS	11432	6:15 PM	ND	11455	6:15 PM	ZM	11454	6:15 PM			5:10 PM	
11412	8:20 PM	MH		8:20 PM			8:20 PM		29093	8:20 PM			8:20 PM	

PI Office Hours: Online-Link for every will be provided on canvas

Periods		Monday	Tuesday	Wednesday	Thursday	Friday
1	7:25 AM – 8:15 AM					
2	8:30 AM – 9:20 AM					
3	9:35 AM – 10:25 AM			JB		
4	10:40 AM – 11:30 AM				LS	
5	11:45 AM – 12:35 PM				LS	
6	12:50 PM – 1:40 PM	MH		MH	JW	MH
7	1:55 PM – 2:45 PM	MH		MH		
8	3:00 PM – 3:50 PM	SS	ND		JW	ZM
9	4:05 PM – 4:55 PM					
10	5:10 PM – 6:00 PM					

Course Description

Overview of logic design, algorithms, computer organization and assembly language programming and computer engineering technology. Laboratory. Credits: 4.

Course Pre-Requisites / Co-Requisites

Digital Logic and Computer Systems (EEL 3701) with a minimum grade of C- is a prerequisite for Digital Design. To be successful in this class, you need to know binary logics, modular combinational and sequential logic, design languages, machine instructions, and finite state machines.

Course Objectives

Students will gain fundamental knowledge and understanding of principles and practice in designing complex digital systems through class lectures, reading assignments, and lab experiments using VHDL and field-programmable gate arrays.

Materials and Supply Fees

List if applicable

Relation to Program Outcomes (ABET):

The table below is an example. Please consult with your department’s ABET coordinator when filling this out.

Outcome	Coverage*
1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics	High
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	High
3. An ability to communicate effectively with a range of audiences	Low
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the	

impact of engineering solutions in global, economic, environmental, and societal contexts	
5. An ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives	
6. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions	High
7. An ability to acquire and apply new knowledge as needed, using appropriate learning strategies	Medium

*Coverage is given as high, medium, or low. An empty box indicates that this outcome is not covered or assessed in the course.

Required Textbooks and Software

- Digital Design Using VHDL: A Systems Approach. William J. Dally, R. Curtis Harting and Tor M. Aamodt Frontmatter, Cambridge University Press, ISBN: 9781316162651
- ISE Fundamentals of Digital Logic with VHDL Design. Brown McGraw-Hill Education; 4th edition (March 23, 2021), ISBN-10: 1260597784, ISBN-13 : 978-1260597783
- Digital Design with RTL Design, VHDL, and Verilog 2nd Edition. Frank Vahid, Wiley; 2nd edition (March 9, 2010), ISBN-10 : 0470531088

Recommended Materials

- Intel® Quartus® Prime Pro Edition User Guides – Combined
- Vivado Design Suite User Guide Design Flows Overview Vivado Design Suite UG892 (v2022.1) April 20, 2022

Course Schedule

Week	Class Topic	Exercise/Lab Session
1	Introduction to VHDL, FPGA Design Environment	
2	Review of RTL and Microarchitecture	Lab Session 0
3	Review of RTL and Microarchitecture	
4	Design of Complex Digital Systems	Lab 1, RTL, Datapath Design
5	Design of Complex Digital Systems	Exercise Session 2
6	System Optimization	Lab Session 2
7	System Optimization	Exercise Session 3
8	High-Level Design	Lab Session 3
9	Verification	Exercise Session 5
10	Verification	Lab Session 4
11	Test and Debugging	Exercise Session 6
12	Test and Debugging	Lab Session 5
13	Final Project	Final Project
14	Final Project	Final Project
15	Final Project	Review

Attendance Policy, Class Expectations, and Make-Up Policy

- Class announcement, communication and exchange among students and between students and instructors will be done through slack. Every student should register through the following link :

Course Title, Prefix, and Number
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https://join.slack.com/t/eel3701digita-fsg1612/shared_invite/zt-1e85ertrn-ON5rHzApJ14HDtLVWVlegg

- 10% of the final grade is made upon class attendance and random quizzes which can be given in class, exercise, or lab sessions.
- Missing a random quiz in class, exercises or lab without proper justification automatically results in a loss of the corresponding number of points.
- Labs consist of two parts: a pre-lab section (in general, theory) that students must complete at home before the lab. Student who failed to submit this section before the lab will not be admitted in the lab session and will automatically lose the corresponding number of points.
- Students are expected to complete their labs during a single session. Students who did not complete their lab can do it in their next lab sections along with the current lab. Students can also complete and demonstrate their design in their PI office hour.
- Lab reports are due one week after the lab. Submission deadline will be provided on Canvas. Late submission of lab reports and homework result in a 10% penalty for every week delay, with a maximum of 40% penalty
- Cell phones are allowed in class, in silent mode only. Students can record the classes and lab only for the purpose of leaning and revision.
- Students who cannot take the exams on the scheduled date must provide proper justification to take a makeup exam.
- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Click here to read the university attendance policies: <https://catalog.ufl.edu/UGRD/academic-regulations/attendance-policies/>

Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Labs		40%
Random Quizzes		05%
Midterm Exam		25%
Final Exam		25%
Total		100%

Grading Policy

The following is given as an example only.

Percent	Grade	Grade Points
93.4 - 100	A	4.00
90.0 - 93.3	A-	3.67
86.7 - 89.9	B+	3.33
83.4 - 86.6	B	3.00
80.0 - 83.3	B-	2.67
76.7 - 79.9	C+	2.33
73.4 - 76.6	C	2.00
70.0 - 73.3	C-	1.67
66.7 - 69.9	D+	1.33
63.4 - 66.6	D	1.00
60.0 - 63.3	D-	0.67
0 - 59.9	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

Students Requiring Accommodations

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Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the disability Resource Center by visiting <https://disability.ufl.edu/students/get-started/>. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester.

Course Evaluation

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.aa.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/>.

In-Class Recording

Students are allowed to record video or audio of class lectures. However, the purposes for which these recordings may be used are strictly controlled. The only allowable purposes are (1) for personal educational use, (2) in connection with a complaint to the university, or (3) as evidence in, or in preparation for, a criminal or civil proceeding. All other purposes are prohibited. Specifically, students may not publish recorded lectures without the written consent of the instructor.

A “class lecture” is an educational presentation intended to inform or teach enrolled students about a particular subject, including any instructor-led discussions that form part of the presentation, and delivered by any instructor hired or appointed by the University, or by a guest instructor, as part of a University of Florida course. A class lecture does not include lab sessions, student presentations, clinical presentations such as patient history, academic exercises involving solely student participation, assessments (quizzes, tests, exams), field trips, private conversations between students in the class or between a student and the faculty or lecturer during a class session.

Publication without permission of the instructor is prohibited. To “publish” means to share, transmit, circulate, distribute, or provide access to a recording, regardless of format or medium, to another person (or persons), including but not limited to another student within the same class section. Additionally, a recording, or transcript of a recording, is considered published if it is posted on or uploaded to, in whole or in part, any media platform, including but not limited to social media, book, magazine, newspaper, leaflet, or third party note/tutoring services. A student who publishes a recording without written consent may be subject to a civil cause of action instituted by a person injured by the publication and/or discipline under UF Regulation 4.040 Student Honor Code and Student Conduct Code.

University Honesty Policy

UF students are bound by The Honor Pledge which states, “We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: “On my honor, I have neither given nor received unauthorized aid in doing this assignment.” The Conduct Code (<https://sccr.dso.ufl.edu/process/student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. If you have any questions or concerns, please consult with the instructor or TAs in this class.

Commitment to a Safe and Inclusive Learning Environment

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Jennifer Nappo, Director of Human Resources, 352-392-0904, jpennacc@ufl.edu
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, taylor@eng.ufl.edu
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, nishida@eng.ufl.edu

Software Use

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

Student Privacy

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

Campus Resources:

Health and Wellness

U Matter, We Care:

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact umatter@ufl.edu so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

Counseling and Wellness Center: <https://counseling.ufl.edu>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

Sexual Discrimination, Harassment, Assault, or Violence

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the [Office of Title IX Compliance](#), located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, title-ix@ufl.edu

Sexual Assault Recovery Services (SARS)

Student Health Care Center, 392-1161.

University Police Department at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

Academic Resources

E-learning technical support, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu. <https://lss.at.ufl.edu/help.shtml>.

Career Resource Center, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu>.

Library Support, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

Teaching Center, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring. <https://teachingcenter.ufl.edu/>.

Writing Studio, 302 Tigert Hall, 846-1138. Help brainstorming, formatting, and writing papers.

<https://writing.ufl.edu/writing-studio/>.

Student Complaints Campus: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>;<https://care.dso.ufl.edu>.

On-Line Students Complaints: <http://www.distance.ufl.edu/student-complaint-process>.