

## Digit Logic and Computer Systems

EEL 3701C

**Class Periods:** MWF, Period 9 (9:35 PM - 10:25 PM)

**Location:** Classroom location

**Academic Term:** Spring 2020

**Instructor:**

Dr. Christophe Bobda

[cbobda@ece.ufl.edu](mailto:cbobda@ece.ufl.edu)

352 294 2024

Office Hours: MF, 02-03PM, Online (Zoom):

<https://ufl.zoom.us/j/98557759523?pwd=eDRzOGhYUGM1cyt4cHdJSDNmNSStqQT09>

**Teaching Assistant/Peer Mentor/Supervised Teaching Student:**

Please contact through the Canvas website

- Supervise Teaching Students:
  - Pankaj Bhowmik ([pankajbhowmik@ufl.edu](mailto:pankajbhowmik@ufl.edu)),
  - Md Jubaer Hossain Pantho ([jmandebimbongue@ufl.edu](mailto:jmandebimbongue@ufl.edu))

**Peer Instructors (PI):**

Name	Brayman Connor (CB)	Herrera Bryce (BH)	Martin Timothy (TM)
e-mail	<a href="mailto:cbrayman@ufl.edu">cbrayman@ufl.edu</a>	<a href="mailto:b.herrera@ufl.edu">b.herrera@ufl.edu</a>	<a href="mailto:tmartinbrevard@ufl.edu">tmartinbrevard@ufl.edu</a>
Name	Wollenhaup Michael(MW)	Nguyen Brittany (BN)	Shmul Daniel (DS)
e-mail	<a href="mailto:mwollenhaup@ufl.edu">mwollenhaup@ufl.edu</a>	<a href="mailto:brittanynguyen@ufl.edu">brittanynguyen@ufl.edu</a>	<a href="mailto:danielshmul@ufl.edu">danielshmul@ufl.edu</a>
Name	Clavijo-Gomez Santiago(SCG)	Shoemaker John (JS)	Ferris Dylan (DJF)
e-mail	<a href="mailto:Santiago.clavijo@ufl.edu">Santiago.clavijo@ufl.edu</a>	<a href="mailto:shoemaker.john@ufl.edu">shoemaker.john@ufl.edu</a>	<a href="mailto:dylanferris@ufl.edu">dylanferris@ufl.edu</a>
Name	Trigg William (WT)	Amir Omer (OA)	Beres Szilard (SB)
e-mail	<a href="mailto:williamtrigg@ufl.edu">williamtrigg@ufl.edu</a>	<a href="mailto:omer.amir@ufl.edu">omer.amir@ufl.edu</a>	<a href="mailto:szilard.beres@ufl.edu">szilard.beres@ufl.edu</a>
Name	Rodriguez Anthony (AR)	Woodahl Clarisse (CW)	Bhowmik Pankaj (PB)
e-mail	<a href="mailto:anthony7131998@ufl.edu">anthony7131998@ufl.edu</a>	<a href="mailto:cwoodahl@ufl.edu">cwoodahl@ufl.edu</a>	<a href="mailto:pankajbhowmik@ufl.edu">pankajbhowmik@ufl.edu</a>
Name	Pantho Md Jubaer Hossain (HJP)		
e-mail	<a href="mailto:mpantho@ufl.edu">mpantho@ufl.edu</a>		

**Exercises/Lab Sections:** Online, Zoom link provided on Canvas

Monday			Tuesday			Wednesday			Thursday			Friday		
Sec	Start	PI	Sec	Start	PI	Sec	Start	PI	Sec	Start	PI	Sec	Start	PI
	9:35 AM		12033	9:35 AM	PB		9:35 AM		12175	9:35 AM	DJF		9:35 AM	
	11:45 AM		12174	11:45 AM	TM	12058	11:45 AM	OA	12057	11:45 AM	DJF	12059	11:45 AM	WT
12169	1:55 PM	HJP	12172	1:55 PM	SCG	12170	1:55 PM	DS	12056	1:55 PM	BH	12171	1:55 PM	SB
12036	4:05 PM	JS	12032	4:05 PM	AR	12168	4:05 PM	CB	12173	4:05 PM	CW	12031	4:05 PM	BN
12029	6:15 PM	MW	12139	6:15 PM	MW	12140	6:15 PM	AR	12035	6:15 PM	CW		5:10 PM	
12138	8:20 PM	PB	12030	8:20 PM	HJP	12034	8:20 PM	OA	12141	8:20 PM	SB		8:20 PM	

**PI Office Hours: NEB 222**

Periods		Monday	Tuesday	Wednesday	Thursday	Friday
1	7:25 AM – 8:15 AM					
2	8:30 AM – 9:20 AM		DJF			
3	9:35 AM – 10:25 AM	CW				
4	10:40 AM – 11:30 AM			DS	JS (Office Hours)	
5	11:45 AM – 12:35 PM	HJP	BH			
6	12:50 PM – 1:40 PM	WT	OA		TM	PB
7	1:55 PM – 2:45 PM		CB			
8	3:00 PM – 3:50 PM		AR	AR		
9	4:05 PM – 4:55 PM			BN		
10	5:10 PM – 6:00 PM	MW	SB			

**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**

Knowledge of a programming language is helpful but not mandatory.

**Course Objectives**

- To learn the fundamentals of logic design and optimization
- To learn the design and optimization of combinational and sequential circuits
- To understand the components of register transfer and their application in computer design
- To understand the organization and operation of existing computing systems, including general purpose, single purpose datapath with wired or microprogramed controllers
- To learn assembler programming, instruction set architectures and approaches to design and optimized general purpose processors

**Materials and Supply Fees**

The National Instruments (NI) Analog Discovery 2 (NAD) board or Digilent Analog Discovery 2 (DAD) board is required for this course (and many other ECE courses). Board ordering information for the NAD can be found at <https://tinyurl.com/NAD-UF-u19> (for \$183, all inclusive) and the DAD-2 (for \$196.90, all inclusive) at <https://tinyurl.com/DAD-UF-u19>. When purchasing the NAD, other discounted items can be found on the same website. If you are an EE student, I also recommend that you obtain the NI Multisim software (for analog circuit design and simulation), available from Digilent for \$39.99. The UF bookstore has the NAD available, for those that want to use financial aid or want it right away. (Online it says that they have the NAD-2 for \$225.)

**Professional Component (ABET):**

This course consists of 3 credits of fundamentals' understanding and 1 credit of practice in laboratory

### 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 solution that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors	
3. An ability to communicate effectively with a range of audiences	
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	

\*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

- Fundamentals of Logic Design 7th Edition, by Jr. Charles H. Roth, Larry L Kinney, Eugene B. John, Cengage Publishing. ISBN-13: 978-1133628477, ISBN-10: 1133628478

### Recommended Materials

- Computer Organization and Design MIPS Edition: The Hardware/Software Interface (The Morgan Kaufmann Series in Computer Architecture and Design) by David A. Patterson, John L. Hennessy, ISBN-13: 978-0124077263

### Course Schedule

Week	Class Topic	Exercise/Lab Session
1	Introduction, Syllabus, Binary Number and Binary Codes	Lab Session 0
2	Binary Number and Binary Codes, Gate-Level Models & Switch Algebra	Exercise Session I
3	Switch Algebra, Introduction to VHDL	Lab Session I
4	Design of Combinational Circuits	Exercise Session 2
5	Sequential Circuits (Latches, Flip Flops Registers)	Lab Session 2
6	Automata/Finite State Machines	Exercise Session 3
7	Register-Transfer-Level (RTL)/Microarchitecture	Lab Session 3
8	Register-Transfer-Level (RTL)/Microarchitecture	Exercise Session 4
9	Control Path/Single Purpose Processor	Lab Session 4
10	Control Path/Single Purpose Processor	Exercise Session 5

11	MIPS ISA/Assembler Programing	Lab Session 5
12	Processor Design	Exercise Session 6
13	Processor Design	Lab Session 6
14	Programmable Logic, Review	Exercise Session 7
15	Review	Lab Session 7

### ***Online Course Recording***

Our class sessions may be audio visually recorded for students in the class to refer back and for enrolled students who are unable to attend live. Students who participate with their camera engaged or utilize a profile image are agreeing to have their video or image recorded. If you are unwilling to consent to have your profile or video image recorded, be sure to keep your camera off and do not use a profile image. Likewise, students who un-mute during class and participate orally are agreeing to have their voices recorded. If you are not willing to consent to have your voice recorded during class, you will need to keep your mute button activated and communicate exclusively using the "chat" feature, which allows students to type questions and comments live. The chat will not be recorded or shared. As in all courses, unauthorized recording and unauthorized sharing of recorded materials is prohibited.

### ***Attendance Policy, Class Expectations, and Make-Up Policy***

This class will be presented online using Zoom and requires access to a working webcam and stable internet connection. I prefer that students keep their camera on during the class so that I can see you as I would during normal face-to-face classes. Studies show that if we can see each other's faces then we will have more engagement, more student success, and more faculty success. However, this is not a requirement. I understand if on certain days you can't have your camera on due to internet bandwidth limitations, other family members, health issues, or any other reasons.

- Even though students are expected to attend classes and labs, there will be no attendance enforcement penalties. However, 10% of the final grade is made upon 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.

Excused absences must be consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

## Evaluation of Grades

Assignment	Total Points	Percentage of Final Grade
Homework Sets (6-7)		20%
Labs (6-7)		20%
Random Quizzes		10%
Midterm Exam		25%
Final Exam		25%
Total		100%

## Grading Policy

Percent	Grade	Grade Points
90 - 100	A	4.00
86.6 - 89.9	A-	3.67
83.3 - 86.6	B+	3.33
80 - 83.3	B	3.00
76.6 - 79.9	B-	2.67
73.3 - 76.6	C+	2.33
70 - 73.3	C	2.00
66.6 - 69.9	C-	1.67
63.3 - 66.6	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

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/>.

## 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 Honor Code (<https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any

condition that facilitates academic misconduct to appropriate personnel. 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
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto: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](mailto: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:** <http://www.counseling.ufl.edu/cwc>, 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](mailto: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://www.crc.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://care.dso.ufl.edu>.

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