EEL 5322 VLSI Circuits and Technology

Class Periods: T, 10-11, 5:10PM-7:05PM; 10, 5:10PM-6:00PM

Location: Online (Zoom)

Academic Term: Spring 2021

Instructor:

Name: Dr. Domenic Forte
Email: dforte@ece.ufl.edu
Telephone: 352-392-1525
Office Hours: Zoom, Tuesdays from 8AM-10AM

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website
- Rabin Acharya, rabin.acharya@ufl.edu, Zoom, Times TBD
- Yunkai Bai, baiyunkai@ufl.edu, Zoom, Times TBD
- David Koblah, dkoblah@ufl.edu, Zoom, Times TBD

Course Description


Course Pre-Requisites / Co-Requisites

- EEL 3308: Electronic Circuits I
- EEL 3701C: Digital Logic

Course Objectives

Specific Outcomes of Instruction: This course focuses on analysis and design of modern digital circuits. Silicon technology and transistors are introduced and described from a digital point of view, and the performance of various circuits is derived and estimated. CMOS digital circuits will be designed and analyzed. Students will layout and design digital complex circuits using layout software and SPICE and cover advanced topics such as manufacturing variations.

Required Textbooks and Software

i. Introduction to Microelectronic Fabrication
   Author - Richard C. Jaeger
   ISBN Number - 0-201-44494-7

ii. Digital Integrated Circuits, A Design Perspective
   Author - Jan. M. Rabaey, A. Chandrakasan, and B.Nikolic

iii. Computer and Software required: Workstations with CADENCE Design system on campus, off-campus can use XWindows or X-terminal on a high-speed internet link to UF Campus Computers, or can use equivalent IC design software

Recommended Materials

i. CMOS: Circuit Design, Layout, and Simulation
   Author: R. Jacob Baker
   ISBN Number - 978-1119481515, 2019
## 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 unmute 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.

## Assignments, Projects, and Exams Tentative Schedule

<table>
<thead>
<tr>
<th>Wk</th>
<th>Date</th>
<th>Tentative Deadlines</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/11-1/17</td>
<td>Homework #1 and Cadence Tutorial 1 Assigned;</td>
</tr>
<tr>
<td>2</td>
<td>1/18-1/24</td>
<td>Cadence Tutorial 1 due (1/17); Tutorial 2 Assigned;</td>
</tr>
<tr>
<td>3</td>
<td>1/25-1/31</td>
<td>Cadence Tutorial 2 due (1/24); Tutorial 3 Assigned;</td>
</tr>
<tr>
<td>4</td>
<td>2/1-2/7</td>
<td>Cadence Tutorial 3 Due (1/31); Homework #1 due (2/4); Homework #2 Assigned</td>
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<tr>
<td>5</td>
<td>2/8-2/14</td>
<td>Exam #1 (2/11); Cadence Project 1 Assigned;</td>
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<tr>
<td>6</td>
<td>2/15-2/21</td>
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<tr>
<td>7</td>
<td>2/22-2/28</td>
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<tr>
<td>8</td>
<td>3/1-3/7</td>
<td>Homework #2 Due (3/4); Cadence Project 1 Due (3/7); Homework #3 Assigned</td>
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<tr>
<td>9</td>
<td>3/8-3/12</td>
<td>Exam #2 (3/11); Final Cadence Project Assigned;</td>
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</table>
Attendance Policy, Class Expectations, and Make-Up Policy

- Due to quantity and of material, it is important to make every attempt to attend class. Slides will be posted but not annotated materials and work on blackboard (except under extenuating circumstances).
- No exam make-up unless a valid excuse is presented beforehand. All valid excuses must be approved by the Professor. Excused absences must be in compliance with university policies in the Graduate Catalog (https://catalog.ufl.edu/graduate/regulations/) and require appropriate documentation.
- All homework assignments must be submitted in class or online before the deadline (no exceptions) since solutions are posted after lecture.
- All projects must be handed in on time or credit will be deducted (10% each day).

Format of Homework

- All homework must be written legibly so that it can be graded. Illegible solutions will be given zero credit.
- Homework can be submitted on Canvas or in class. If submitted in class, the homework must contain a cover sheet with the student’s name, UFID, homework assignment number, and due date. Any homework without this information will receive zero credit. If submitted in class, the homework must be stapled. Any homework that is not stapled will receive zero credit.

Projects

- Three Cadence tutorials and two layout/simulation projects will be assigned throughout the semester. All are completed individually except for the final project which is completed in groups.
- All project materials will be checked for plagiarism using Turnitin software feature in Canvas. See University Honesty Policy below.

Evaluation of Grades

- Class Examination 56%
  - (Exam #1) (14%)  
  - (Exam #2) (14%)  
  - (Exam #3) (14%)  
  - (Comprehensive Final Exam) (14%)  
- Homework 14%
- Cadence 30%
  - (Tutorial #1) (1.25%)
  - (Tutorial #2) (1.25%)
  - (Tutorial #3) (2.5%)
  - (SRAM Assignment) (10%)
  - (Final Project) (15%)
**Grading Policy**

<table>
<thead>
<tr>
<th>Percent</th>
<th>Grade</th>
<th>Grade Points</th>
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<tbody>
<tr>
<td>90.0 - 100.0</td>
<td>A</td>
<td>4.00</td>
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<tr>
<td>87.0 - 89.9</td>
<td>A-</td>
<td>3.67</td>
</tr>
<tr>
<td>84.0 - 86.9</td>
<td>B+</td>
<td>3.33</td>
</tr>
<tr>
<td>81.0 - 83.9</td>
<td>B</td>
<td>3.00</td>
</tr>
<tr>
<td>78.0 - 80.9</td>
<td>B-</td>
<td>2.67</td>
</tr>
<tr>
<td>75.0 - 79.9</td>
<td>C+</td>
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</tr>
<tr>
<td>72.0 - 74.9</td>
<td>C</td>
<td>2.00</td>
</tr>
<tr>
<td>69.0 - 71.9</td>
<td>C-</td>
<td>1.67</td>
</tr>
<tr>
<td>66.0 - 68.9</td>
<td>D+</td>
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<td>D</td>
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<tr>
<td>60.0 - 62.9</td>
<td>D-</td>
<td>0.67</td>
</tr>
<tr>
<td>0 - 59.9</td>
<td>E</td>
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More information on UF grading policy may be found at [https://catalog.ufl.edu/graduate/regulations/](https://catalog.ufl.edu/graduate/regulations/)

**Students Requiring Accommodations**

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, [https://www.dso.ufl.edu/drc](https://www.dso.ufl.edu/drc)) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure 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/](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/](https://ufl.bluera.com/ufl/). Summaries of course evaluation results are available to students at [https://gatorevals.aa.ufl.edu/public-results/](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/](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
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: 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

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.


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/.

Student Complaints Campus: https://care.dso.ufl.edu.