

Electronic Circuits

EEE3308C

Class Periods: Tuesdays (1:55 PM- 2:45 PM) | Thursdays (1:55 PM- 3:50 PM)

Location: NEB 202

Academic Term: Spring 2023

Instructor:

Name: Najme Ebrahimi

Email Address: najme@ece.ufl.edu

Office Hours: Tuesdays (3 PM-4PM)/ Thursdays (4 PM- 5PM) on Zoom

Teaching Assistant/Peer Mentor/Supervised Teaching Student:

Please contact through the Canvas website

Liam Negron: liam.negron@ufl.edu

Cameron Mendoza: cameron.mendoza@ufl.edu

Ian Press: ian.press@ufl.edu

Course Description

Fundamentals of electronic circuits and systems. Lab.

Course Pre-Requisites / Co-Requisites

EEL 3111C Circuits 1

Course Objectives

Practical electronics: How do you create circuits to do useful things?

Basic electronic elements

Design-oriented analysis

Materials and Supply Fees

Diligent Analog Discovery Board: Required. Versions 1 or 2 are OK. Works with PC or Mac.

Parts Kit: **You will need to order your own parts.** See Parts List on the Canvas page.

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	High
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	Medium
5. An ability to function effectively on a team whose members together provide leadership, create a	High

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

A. Sedra and K. Smith, *Microelectronic Circuits*, 8th Ed. (You will need access to the textbook. Digital is fine.)

Labs/ Times: (Location: NEB0109)

Mondays: Period 11 - E1 (6:15 PM - 8:10 PM)

Tuesdays: Period 4 – 5 (10:40 AM - 12:35 PM)

Wednesdays: Period 4 – 5 (10:40 AM - 12:35 PM)

Wednesdays: Period 6 - 7 (12:50 PM - 2:45 PM)

Wednesdays: Period 11 - E1 (6:15 PM - 8:10 PM)

Thursdays: Period 3 - 4 (9:35 AM - 11:30 AM)

Fridays: Period 5 - 6 (11:45 AM - 1:40 PM)

Please contact UPIs for scheduling:

Liam Negron: liam.negron@ufl.edu

Cameron Mendoza: cameron.mendoza@ufl.edu

Ian Press: ian.press@ufl.edu

UPI Office Hours: TBD

Course Schedule

Week 1: Logistics, Intro to Electronics/ Design-oriented analysis, KCL, KVL/Voltage/current dividers, Cascaded Amps/ **Chapter 1**

Week 2: Op-Amps, Application of Op-Amps/ Ideal vs. Non-Ideal Op-Amps/AC coupling, Biasing, Port Resistances/ **Chapter 2/ Lab 1 is in this week**

Week 3: GBW, Poles and Zeros, Feedback/ Diodes: Ideal and Non-Ideal/ Diodes: Ideal and Non-Ideal/ Wave Rectifiers/ **Chapter 2/ 10 (partial) and chapter 4/ Lab 2 is in this week**

Week 4: AC-DC Converters, Other Diode App/ **Chapter 4 and Lab 2**
Review for Test 1 and **Test 1**

Week 5: BJTs, small/large-signal concepts/ Biasing BJTs, BJT Ckts (Part 1) / BJT Ckts (Part 2), Coupling/Bypass caps / **Chapter 6-7 / Lab 3 is in this week**

Week 6: Transitioning to MOSFETs from BJTs/ N-MOSFET Physics and Regions / P-MOSFET Physics, MOSFET I-V / **Chapter 5 / last part of Lab 3 and Lab 4 are in this week**

Week 7: Biasing, small/large-signal concepts/ MOSFET amplifiers (part 1): CS, CG, CD/ MOSFET amplifiers (part 2): CS, CG, CD / **Chapter 5, 7 / Lab 5 is in this week**

Week 8: Degeneration, Cascoding, Folding/ Multi-stage amplifier design example/ Current mirrors and Active load (Part 1)/ **Chapter 5, 7, and 8 / Spice**

Week 9: Examples and Review of MOSFET amp. And preparation for **Test 2 / Test 2**

Week 10: Current mirrors and Active load (Part 2)/ Differential Amp (Part 1 and Part 2)/ **Chapter 9 / Spice and Lab 6 is in this week** / (This week is after Spring Break Week)

Week 11: Instrumentation Amplifier, Comparator/ Frequency Response of Amp. (Part 1 & Part 2) / **Chapter 10 / Spice and Lab 6 is in this week**

Week 12: Op-Amps Revisited: Int. Circuitry (Part 1) / **Chapter 9 / Lab 7 is in this week**
Test 3 will be in this week

Week 13: Opamp and amplifier Revisited/ Logic and inverters, introductions to digital circuits / **Chapter 16**

Week 14: Logic: NAND, NOR, delay/ Logic: Transmission gate / **Chapter 16 /**

Week 15: Final Review (Part 1-2)

Attendance Policy, Class Expectations, and Make-Up Policy

Homework: ~ 1 per week

- Usually assigned Monday; due by class start time on Friday, where solutions will be discussed
- Goals are to illustrate and reinforce lecture topics and provide practice for quizzes
- Lowest score will be dropped
- It's OK to work in groups or to get tips from other students; you must push your own calculator buttons and the work you turn in must be your own.
- You won't learn as much from the homework if you depend on somebody else to tell you how to do it.
- Turn in homework online in Canvas as .pdf or .doc are preferred, .xls, or .asc are accepted.
- Late homework may be accepted at the instructor's discretion, typically for reduced credit.
- Turning in homework late based on my published solutions would be cheating.

Class Meetings:

Class Participation: The lectures will be recorded in the classroom, and available through Zoom. The lectures will be recorded and posted to MediaSite, where you can watch when you want. Whenever possible you should watch the lectures in real time so you can ask questions and participate in chats.

Zoom Etiquette:

I can teach more effectively if you keep your video on and audio off during lectures.

- Attendance at labs is required. Work out any conflicts with the lab UPI in advance if possible and/or arrange makeups.

Handouts: I put as much as possible in the notes, but the lectures usually cover more.

Textbook: Anything in an assigned chapter of the book is fair game unless I tell you otherwise.

Problems: Work as many as you can find, this is the best possible test preparation.

Supplementary problems: Sometimes we can help find more; try assigning yourself design problems and look at other books.

SPICE Assignments:

- LTSpice. Download from <http://www.linear.com/designtools/software/>
- To help debugging SPICE runs, we need print-outs of input and output files, a schematic with labeled node numbers, .OP (Bias Point Detail) information, .OPTIONS, .MODELS, etc.

Labs:

Labs in 3308C are run similarly to 3701.

1. Before starting your lab section you will be expected to:
 - a. Understand the lab manual
 - b. Analyze and build the circuits
 - c. Perform most measurements at home with your Analog Discovery board
 - d. Submit your pre-lab document on Canvas 15 min before your lab section
2. You must demonstrate your working circuit by the end of your lab section
3. A **lab handout** will be provided on Canvas for each lab. The lab handout is broken into pre-lab and in-lab sections. They will be graded separately.
4. The pre-lab steps and results are due before the lab starts.
5. You complete the in-lab steps while in contact with your UPI, and turn in
6. Failure to do any of these will negatively affect your lab score
7. **Lab Manuals** and **Pre-Lab documents** will be accessible before your lab date
8. There will be office hours to answer questions and help you get your lab working

How to study for this course:

The best way to learn how to analyze circuits and to prepare for tests is to practice. There are at least two sets of skills that you must master. One is figuring out how to approach an unfamiliar circuit or problem; the other is how to work through the solution to the problem or the analysis. If you always get help with setting up the problem, or just watch someone else solve the problem, you do not get any practice at all. To learn this material and to do well in the course, you must work problems and analyze circuits by yourself.

Make-Up Opportunities:

It is very hard for me to make you a customized exam. With a University-approved excuse and arranged for in advance, or in an emergency, a make-up exam will of course be allowed.

Evaluation of Grades

Assignment	Percentage of Final Grade
Homework Sets	15% (drop lowest one)
Lab, projects	15%
Tests (3 @ 25% each)	70%
	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

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 Honor 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. 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
- 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 Connections 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: <https://distance.ufl.edu/state-authorization-status/#student-complaint>.