

## EEE4306 Electronic Circuits

### Tentative Syllabus v1.0

Spring 2022

Lecture Topic		
W 5	1	Amplifiers intro, design-oriented analysis
Jan F 7	2	Review MOSFET/BJT regions of operation
M 10	3	Review MOSFET/BJT amplifiers
W 12	4	Active loads, PMOS
F 14	5	More FET amplifiers
M 17		<b>MLK Day -- No class</b>
W 19	6	Current mirrors, current amplifiers
F 21	7	Feedback intro, loop gain, ideal gain
M 24	8	Loop gain
W 26	9	Series, shunt resistances
F 28	10	<b>Test 1</b>
M 31	11	More FB, op amp applications
W 2	12	Diff pair active load
F 4	13	Op amp circuits, diff pair, comparator
M 7	14	Vos, CM range

W 9	15	Time-constant analysis
F 11	16	Frequency response, GBW
M 14	17	Phase margin, compensation
Feb W 16	18	2-stage op amp, DC
F 18	19	2-stage op amp transient, slew rate
M 21	20	PSRR, CMRR
W 23	21	Input-referred errors, noise
F 25		<b>Test 2</b>
M 28	22	Noise optimization
W 2	23	Output stages
F 4	24	Power amplifiers
7 - 11		<b>No Class – Spring Break</b>
M 14	25	Power supplies, regulators
Mar W 16	26	Filters
F 18	27	Filters
M 21	28	Second-order filters, universal filter
W 23	29	Parallel and series resonance
F 25	30	Sinewave oscillators

M 28	31	Comparators, Schmitt trigger
W 30	32	Multiplier
F 1		<b>Test 3</b>
M 4	33	Electronics history 1, Telegraph, Relays
W 6	34	Electronics history 2, Wireless
F 8	35	Tuned RF amps
M 11	36	Transformer coupling
W 13	37	Colpitts, crystal oscillators
Apr F 15	36	Superheterodyne, mixer
M 18	37	Phase-locked loop
W 20	38	AM Transmitter
28		<b>Final Exam 12:30 – 2:30</b>

## EEE4306 Electronic Circuits 2

Spring 2022

**Description:** Principles and applications of analog and digital electronics

**Prerequisites:** EEL3308 Electronic Circuits 1 EEL3112 Circuits 2 EEL3008 EE Physics

**Class times:** MWF 7th period (1:55 PM – 2:45 PM)

**Professor:** Robert Fox (fox@ece.ufl.edu) LAR 330

**Fox's office hours:** Contact me any time to set up a call or Zoom meeting

**Course Topics (typical)**

- Review of transistor models, regions of operation, biasing, amplifier analysis (7 lectures)
- Frequency response (4 lectures)
- Feedback analysis (5 lectures)
- Op amp circuits, specifications, noise, compensation, stability (8 lectures)
- Power amplifiers (2 lectures)
- Op amp applications, filters, oscillators (5 lectures)
- RF electronics, tuned amplifiers (7 lectures)

**Course Organization:** Each major topic will include homework assignments emphasizing analysis and design. Three tests plus a final exam.

**Text:** A. Sedra and K. Smith, *Microelectronic Circuits*, 8<sup>th</sup> Ed., Oxford University Press.

**Recommended:** *The Art of Electronics*, Horowitz and Hill

**Software:** LTSpice: <http://www.linear.com/designtools/software/#LTspice> (Links to an external site.)

#### **Grading:**

HW:	15% (drop lowest one)
Tests: 3 @ 20% each:	60%
Final exam:	25%

- Final exam: Thursday April 28, 12:30 – 2:30 PM

#### **Course Themes:**

- Feedback
- Practical electronics: How do you create circuits to do useful things?
- Design-oriented analysis

#### **Special Covid/Delta Variant Information**

Lectures in EEE4306 will be presented live from the classroom, and will be presented in real time through Zoom, recorded, and posted on Canvas. Classroom attendance is not required. However, you should participate in the lectures in real time if possible, so you can ask questions and chat with the rest of the class. **In fall, some students seemed to have fallen behind because they didn't stay up to date. Please do not let this happen to you.**

You are expected to wear approved face coverings at all times during class and within buildings even if you are vaccinated. Please continue to follow healthy habits, including best practices like frequent hand washing. Following these practices is our responsibility as Gators.

If you are sick, stay home and self-quarantine. Please visit the UF Health Screen, Test & Protect website about next steps, retake the questionnaire and schedule your test for no sooner than 24 hours after your symptoms began. Please call your primary care provider if you are ill and need immediate care or the UF Student Health Care Center at 352-392-1161 or email [covid@shcc.ufl.edu](mailto:covid@shcc.ufl.edu) to be evaluated for testing and to receive further instructions about returning to campus. UF Health Screen, Test & Protect offers guidance when you are sick, have been exposed to someone who has tested positive or have tested positive yourself. Visit the [UF Health Screen, Test & Protect website \(Links to an external site.\)](#) for more information.

Tests will held in class, during class time

**There is no lab, but we might build a few circuits and test them using DAD/NAD boards.**

**Digilent Boards/National Instruments boards.**

- I also recommend the Analog Parts Kit

**Tests:** Closed-book, with formula sheets online during regular class period using HonorLock.

**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, .doc, .xls, or .asc.
- 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.

### **Attendance:**

This class will be presented face to face in class. I will record the lectures and publish them on Zoom. Note the official policy (below) giving students the right to record lectures.

- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. Appropriate documentation may be required.  
See <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx> (Links to an external site.).

- You are responsible for everything in the lecture unless I tell you otherwise.
- Handouts: I put as much as possible in the notes, but the lectures usually cover more
- Textbook: Supplements lecture; follow by topic; syllabus may include some pointers to topics
- Problems: Work as many as you can find: the best possible quiz 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/> (Links to an external site.).
- To help debugging SPICE runs, I need print-outs of input and output files, a schematic with labeled node numbers, .OP (Bias Point Detail) information, .OPTIONS, .MODELS, etc.
- If you turn in .asc files, make sure all needed files are included.

### **Academic 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 (<http://www.dso.ufl.edu/sccr/process/student-conduct-honor-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.
- You are expected to do your own work.
- You are expected to report any violations of the Honor Code that you become aware of.
- It is a violation of the Honor Code to turn in solutions to homeworks or tests copied from other students or from published handouts or solutions.
- You are welcome to work with other students on homeworks and lab reports. However, once you understand the method of solution you should work through the calculations yourself.

### **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. If you have a University-approved excuse and arrange for it in advance, or in an emergency, a make-up exam will be allowed.

**Professional Component (ABET):**

This course consists of 1.5 credits of Engineering Design and 1.5 credits of Engineering Science

**Relation to Program Outcomes (ABET):**

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	High
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	High
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	Medium
4. An ability to communicate effectively with a range of audiences	Medium
5. 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.	Low
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate,	Medium

integrate, and apply this knowledge appropriately.

7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty Low

### ***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/> (Links to an external site.). 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/> (Links to an external site.). 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/> (Links to an external site.). Summaries of course evaluation results are available to students at <https://gatorevals.aa.ufl.edu/public-results/> (Links to an external site.).

### ***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***

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- You are expected to report any violations of the Honor Code that you become aware of.
- It is a violation of the Honor Code to turn in solutions to homeworks or tests copied from other students or from published handouts or solutions.
- You are welcome to work with other students on homeworks and lab reports. However, once you understand the method of solution you should work through the calculations yourself.

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### ***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](mailto:jpennacc@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> (Links to an external site.)

## **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:** <https://counseling.ufl.edu> (Links to an external site.), 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 \(Links to an external site.\)](#), 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/> (Links to an external site.).

### *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> (Links to an external site.).

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling; <https://career.ufl.edu> (Links to an external site.).

**Library Support**, <http://cms.uflib.ufl.edu/ask> (Links to an external site.). 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/> (Links to an external site.).

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers. <https://writing.ufl.edu/writing-studio/> (Links to an external site.).

**Student Complaints Campus**: <https://sccr.dso.ufl.edu/policies/student-honor-code-student-conduct-code/> (Links to an external site.); <https://care.dso.ufl.edu> (Links to an external site.).

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process> (Links to an external site.).