

**EEE4306 Electronic Circuits
Tentative Syllabus
Spring 2020**

			Lecture		7 th Edition
	M	6	1	Amplifiers intro, design-oriented analysis	
Jan	W	8	2	Review MOSFET/BJT regions of operation	
	F	10	3	Review MOSFET/BJT amplifiers	
	M	13	4	Active loads, PMOS	
	W	15	5	More FET amplifiers	
	F	17	6	Current mirrors, current amplifiers	
	M	20		MLK Day -- No class	
	W	22	7	Feedback intro, loop gain, ideal gain	
	F	24	8	Loop gain	
	M	27	9	More FB, op amp applications	
	W	29	10	Series, shunt resistances	
	F	31		Test 1	
	M	3	11	Diff pair active load	
	W	5	12	Op amp circuits, diff pair, comparator	
	F	7	13	Vos, CM range	
	M	10	14	Time-constant analysis	
	W	12	15	Frequency response, GBW	
Feb	F	14	16	Phase margin, compensation	
	M	17	17	2-stage op amp, DC	
	W	19	18	2-stage op amp transient, slew rate	
	F	21	19	PSRR, CMRR	
	M	24	20	Input-referred errors, noise	
	W	26	21	Noise optimization	
	F	28		Test 2	
	M-F	2-6	22	Output stages	
	M	9	23	Power amplifiers	
	W	11	24	Power supplies, regulators	
Mar	F	13	25	Switching regulators, charge pump	
	M	16	26	Power amplifiers	
	W	18	27	Filters	
	F	20	28	Parallel and series resonance	
	M	23	29	Second-order filters, universal filter	
	W	25	30	Sinewave oscillators	
	F	27	31	Relaxation oscillators	
	M	30	32	Comparators, Schmitt trigger	
	W	1	33	CMOS logic	
	F	3		Test 3	
	M	6	34	Electronics history, vacuum tubes	
	W	8	35	Tuned RF amps	
	F	10	36	Transformer coupling	
Apr	M	13	37	Colpitts, crystal oscillators	
	W	15	38	Superheterodyne, mixer	
	F	17	39	Phase-locked loop	
	M	20	40	Wave-shaping circuits	
	W	22	41	Review for final	
				Final Exam	

EEE4306 Electronic Circuits 2

Spring 2020

Description: Principles and applications of analog and digital electronics

Prerequisites: EEL3308C Electronic Circuits 1

Class times: MWF 5th period (11:45 AM – 12:35 PM)

Room: LAR 330

Professor: Robert Fox (fox@ece.ufl.edu) NEB 537

Fox's office hours: I'm available almost every day. Email to make sure I'm in.

Supervised Teaching PhD Student: TBD

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*, 7th Ed., Oxford University Press.

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

Diligent Analog Discovery Board: Versions 1 or 2 are OK. Works with PC or Mac. See <http://tinyurl.com/NAD-UF-f17>.

Software: LTSpice <http://www.linear.com/designtools/software/#LTspice>

Grading:

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

- Final exam: Thursday April 30, 10 AM – 12 AM

Course Themes

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

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

Diligent Boards/National Instruments boards.

· I also recommend the Analog Parts Kit

Tests: Closed-book, with formula sheets in-class during regular class period. **Homework:** ~ 1 or 2 per week

- Usually due next class, where solutions will be discussed
- Goals are to illustrate and reinforce lecture topics and to 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.
- Homework is usually assigned at the end of a lecture and is almost always due just before the start of the next class meeting.
- I go over the homework solutions at the start of the next class, while it's fresh in your mind.
- Turn in homework electronically 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:

- Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies. See <https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>.
- I'll be tracking attendance using the multi-platform clicker software PollEverywhere. I'll help you get signed up using your ufl email address. If you create an account using a different email address we may lose track of you.
- Soon after the beginning of each class meeting, I'll provide a few warm-up questions plus a "secret word" question to answer using your phone or computer.
- You are responsible for everything in the lecture unless I tell you otherwise.
- If you need to miss class, be sure to see me or a TA to find out what you missed.
- 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/>.
- 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, labs 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.
- Do not send someone the “secret word” so they can pretend to be present when they’re not.

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, integrate, and apply this knowledge appropriately.	Medium
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 requesting accommodations should first register with the Disability Resource Center (352-392-8565, <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.ua.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.ua.ufl.edu/public-results/>.

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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
- Robin Bielling, Director of Human Resources, 352-392-0903, rbielling@eng.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: <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>.

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>.