EEE 6321 Analog IC Design 2
Tentative Spring 2016 Syllabus

			Lect	Topic	Reading	Other
Jan	6	W	1	Intro,	Ch. 1	Videos
Jan	8	F	2	Semiconductors, PN junctions, BJTs	Ch. 2	
Jan	11	M	3	Transistor models		HW1 Semicond
Jan	13	W	4	BJT structures, models, parasitics		
Jan	15	F	5	MOS, SPICE, Design-oriented analysis	Ch. 3	
Jan	18	M		**MLK Day -- No class**		
Jan	20	W	6	Curr. mirror, multi-stage amps	Ch. 6	HW2 Biasing
Jan	22	F	7	Cascode	Ch. 5	HW3 Curr mirrors
Jan	25	M	8	Diff amps, active loads, op amp at DC	Ch. 4	HW4 Cascode
Jan	27	W	9	Old Quiz 1's		
Jan	29	F		**Quiz 1**		
Feb	1	M	10	Diff pair, feedback intro; loop gain	Ch. 7	
Feb	3	W	11	Series and shunt		HW5 Feedback
Feb	5	F	12	Ideal feedback gain, non-ideal port impedances		
Feb	8	M	13	Feedback special cases, loop gain in simulation		
Feb	10	W	14	Phase margin		HW6 Phase Margin
Feb	12	F	15	2-stage op amp AC, transient, slew rate		
Feb	15	M	16	Loop gain zeros, FB examples		
Feb	17	W	17	Noise		HW7 Amp analysis
Feb	19	F	18	Regulated cascode, leveraged OTA		HW8 Folded cascode
Feb	22	M	19	Bias generators, multiple Q points, tempco's		
Feb	24	W	20	SPICE distortion analysis		
Feb	26	F		**Quiz 2**		
Mar	3-7	M-F		**Spring break – no classes**		
Mar	7	M	21	Current feedback, compensation for external C's		
Mar	9	W	22	Differential signaling, CMFB		Filters Videos
Mar	11	F	23	Integrated filters: Active, MOS-C, Gm-C		Gm-C Video
Mar	14	M	24	Gm-C: Gyrators, scaling, etc.		
Mar	16	W	25	Gm-C examples		HW9 Gm-C
Mar	18	F	26	Parasitic effects, series/parallel transform		
Mar	21	M	27	Transistor-level Gm-C design		HW10 Full Diff
Mar	23	W	28	Triode-region transcondctor example		
Mar	25	F		**Quiz 3**		
Mar	28	M	29	Nonlinearity simulation	Ch. 9	HW11 Transconductor
Mar	30	W	30	Automatic tuning	12.9	
Apr	1	F	31	CMFB examples		
Apr	4	M	32	Tuning loop gains, amplitude detector		
Apr	6	W	33	Phase detectors		
Apr	8	F	34	NIC, DDA, self-bias cascode, PSRR		
Apr	11	M	35	Phase-locked loops	Ch. 19	
Apr	13	W	36	PLL phase detectors		
Apr	15	F	37	PLL noise, jitter		
Apr	18	M	38	Comparators	Ch. 10	
Apr	20	W		**Quiz 4**		

This syllabus is subject to revision. In fact, it is certain to change significantly.

Analog Integrated Circuit Design 2

EEE 6321
3 Credits
Spring Semester, 2016

Class times: MWF 7th period (1:55 – 2:45 PM) **Room:** 102 NEB

Text: T. Carusone, D. Johns, K. Martin, *Analog Integrated Circuit Design*, 2nd Ed., Wiley, 2011; plus excerpts from several sources.

References: Gray and Meyer, *Analysis and Design of Analog Integrated Circuits*, A. Hastings, *The Art of Analog Layout*, Prentice Hall, 2001; Baker, *CMOS Circuit Design, Layout and Simulation*, IEEE Press/Wiley; Razavi, *Design of Analog CMOS Integrated Circuits*, McGraw-Hill, 2001.

Prerequisites: Upper-level analog circuits (EEE5320, EEE4306 or equivalent) or consent of instructor

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TA: TBA **Email**: TBA **Office hours**: TBA

Course web address: Canvas

Overview:

This course examines techniques for designing analog circuits in technologies optimized for digital applications. The course covers MOS amplifier design and applications including continuous-time filters. Whenever possible we will demonstrate the concepts of Design-Oriented Analysis. The course incorporates computer simulation using SPICE.

Office Hours: I am happy to meet with you to answer questions and discuss course or other material whenever I have time. I am in my office roughly 9 AM to 5 PM most days; most of my free time is in the afternoon.

Computer facilities: LTSpice, download at www.linear.com/designtools/software/ltspice.jsp

Grading:

Quizzes 1 and 3:	20% each
Quizzes 2 and 4:	24% each
HW, Projects:	12%

Quizzes are 55 minutes, open-book, open-notes.

Final: No final exam

Homework: About one homework set per week, plus three or four group design assignments. Homeworks turned in more than a few minutes after class begins will receive reduced credit.
Disabilities Accomodations: Students requesting classroom accommodation must first register with the Dean of Students Office. The Dean of Students Office will provide documentation to the student who must then provide this documentation to the Instructor when requesting accommodation.

UF Religious Holiday Policy: "Students, upon prior notification of their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith. No major test, major class events or major university activity should be scheduled on a major religious holiday. Professors and university administration shall not penalize students who are absent from academic or social activities because of religious observance. Students shall be permitted a reasonable amount of time to make up material or activities covered in their absence."

To excuse religious holidays, students need to give the instructor a 1 week notice prior to the specific holiday.

UF Counseling Services: Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
- University Counseling Center, 301 Peabody Hall, 392-1575, Personal and Career Counseling.
- SHCC mental Health, Student Health Care Center, 392-1171, Personal and Counseling.
- Center for Sexual Assault/Abuse Recovery and Education (CARE), Student Health Care Center, 392-1161, sexual assault counseling.
- Career Resource Center, Reitz Union, 392-1601, career development assistance and counseling.

Software Use: All faculty, staff and student 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.

Honesty Policy

All students admitted to the University of Florida have signed a statement of academic honesty committing themselves to be honest in all academic work and understanding that failure to comply with this commitment will result in disciplinary action. This statement is a reminder to uphold your obligation as a UF student and to be honest in all work submitted and exams taken in this course and all others.

Simply, you are not allowed to cheat or to tolerate cheating. The University's detailed honesty policy, which I follow, can be found at http://www.dso.ufl.edu/judicial/. The rules you are expected to follow are listed on that web page. Please go to the site and read the material for students. You should also familiarize yourself with the procedures to be followed by faculty members, which also include students' rights to dispute allegations of dishonesty.

Specifically for my class: you may consult with other students on homeworks or projects. In fact, some projects and homeworks will be assigned to be worked on in groups. However, solutions or reports that you turn in as your own must be **your work alone**. For example, in a simulation project assigned to you alone, you must create your own computer files and run your own simulations. For group projectss, solutions from a group must list only those students who actually contributed to the work.

Attendance

Since the class is taped, you may get by without coming to class. I hope you'll come to class whenever you can. Students watching the course video depend on the in-class students to ask questions that they can't ask.

Make-Up Opportunities

I work very hard to create exams, so it is very hard for me to create an extra exam just for you. If you have a University-approved excuse and arrange for it in advance, a make-up exam will be allowed. Job interviews, weddings, family reunions and away football games are examples of events that are not University-approved.

Grading

The TA will usually grade homeworks. I'll ask her to grade pretty leniently. I'll grade the quizzes. Using the percentages describes above, I'll form an overall score and use it to rank order all students. Then I'll put borders between scores to assign letter grades to make things as fair for the whole class and for all students as possible. Sometimes students ask me to literally "give" them the next higher grade. I never do that; if I did, every student would tend to ask for a higher grade, and that process would never stop.

Typically the average grade for students who are still participating by the end of the semester is around a 3.1, between B and B+.

Homework

Typically, I assign about one homework per week. Usually the homework solutions are due at the start of the next lecture. I go over the solution and release a written solution at the beginning of the lecture. Similar procedures apply for quiz solutions.

Homework/quiz procedures for on-campus students

On-campus students turn in their homework before the start of class. Students should turn in paper solutions to the front of the class before class starts. (Electronic submissions prior to that time are also acceptable.) Any on-campus solutions turned in more than a few minutes late are ineligible to receive full credit. (How much credit is assigned for work turned in late will be up to me and the TA.)

Once the homework solutions have been graded (usually within a few days), the TA will put them in alphabetical order, and I will pass the stack of graded papers back to you in class.

Please do not look at other people's grades. It seems trivial, but it could be considered a violation of US Federal privacy laws that a student could see another student's grade. **If you feel that your privacy might be violated by this procedure, let me know**, and we will hold your papers out of the stack of papers to be returned.

Many of you use several different names. The solutions will be in alphabetical order, based on the "LAST NAME" that UF's computer uses for you. Please put THAT NAME on your paper so we can put it in proper alphabetical order. That way you should be able to quickly find your paper in the stack of returned papers.

Homework procedures for online students

Now, for EDGE students, other procedures apply. Please turn your solutions by email to me and to the TA. PDF, MS Word, MS Excel, and possibly other formats are acceptable. As soon as the TA or I see that you have turned in an assignment, we'll send you an email with links to the solution videos (in several formats). The email will also contain a .pdf file of the homework solution. Grading info for the homework will follow within a few days.

Timing issues for online students

EDGE policy is that quizzes and homework should be graded and returned within one week after you turn them in. We usually do much better than that. On the other hand, EDGE policy is that you should not fall more than one week behind real time.

In principle I'm not worried about exactly when you turn in the assignments, as long as it's less than one week behind real time. However, you can't progress in the class (watch all of the videos) until you've turned in the homework.

Of course, one of the nice things about taking this course online is that if family or work issues force you to take an extra day or two, then you have that freedom. In effect, you have a "buffer" that you can use to allow some "slack." If you fall behind more than a few days, you get in danger of losing touch with the class, so you should avoid that. If you get a whole week behind, then you've lost your "buffer". Please let me know if you're going to be more than a few of days behind, and then you need to catch up as soon as you can to restore your flexibility.

The one-week limit applies to quizzes as well, with the same strong suggestion not to fall that far

behind.