Radio Frequency Electronics Syllabus Fall 2020

EEE 5374, Sections 1FE2, 2FED, and 3243
Class Periods: Tuesday, 7th period, 1:55pm to 2:45pm and Thursday, 7th and 8th Period, 1:15pm to 3:50pm
Location: Online Class
Academic Term: Fall 2020

Instructor:
William Eisenstadt
Emails: wre@tec.ufl.edu
Office Phone Number: (352) 392-4946
Office Hours: Eisenstadt, Online office hours: Tuesday, 2:00pm to 3:00pm, Thursday, 4:00pm to 5:00pm.

Supervised Teaching Student:
Please contact through the Canvas website
- Chin-Wei Chang, changchinwei@ufl.edu, TBA

Course Description
Teaches RF Electronic circuit design for a modern wireless transceiver and the RF circuit theory necessary to guide good design choices. The students learn to use RF IC design tools to design an RF low noise amplifier IC as part of a team final design project.

Course Pre-Requisites
Basic Electronic Circuits. Students may not take this course if they have already taken EEE 4373.

Course Objectives
To develop proficiency in analyses, design and implementation of radio frequency circuits. To develop expertise in using the Agilent ADS design system for circuit design.

Materials and Supply Fees
None

Required Textbooks and Software
- Title: RF Microelectronics
- Author: Behazad Razavi
- Publication date and edition: Prentice Hall, 2012 Second Edition
- ISBN number: ISDN 0-13-713473-8

Course Schedule

Prof. Eisenstadt will deliver all the online lectures except for supplemental RF and ADS design lectures and recital lectures by Supervised Teaching Student Chin-Wei Chang.

Week 1:   Introduction to RF Electronics, Modern CMOS MOS Transistors, Simple MOS Amplifier (Razavi Chapter 1, handouts)
Week 2:   Review of MOS analog building blocks and amplifier circuits (Razavi 2.1, handouts)
Week 3:   Basic RF concepts, Nonlinearity, Noise in RF circuits (Razavi 2.2, 2.3)
Week 4:   Noise, Noise Calculations Examples (Razavi, 2.3)
Week 5:   S-parameters, s-parameter examples, Dynamic Range (Razavi, 2.4, 2.6,)
Week 6:   Sensitivity and Dynamic Range, Analog Modulation, Digital Modulation (Razavi 3.2, 3.3)
Week 7:   Basic Heterodyne Receivers, Modern Receivers, Exam 1 (Razavi 4.1, 4.2)
Week 8:   Modern Receivers,   Basic RF Filter Analysis, RF Series to Parallel (Basic Matching Networks) (Razavi 4.3, 2.5, handouts)

Week 9:	LNA Considerations, LNA Topologies, LNA Design CS and CG, ADS Design Project Assigned to Students (Razavi 5.1, 5.2, 5.3))
Week 10:	LNA Design CS and CG, Capacitive Transformer, MOS Time Constant Circuits (Razavi 5.3, handouts)
Week 11:	Passive RF Circuits, RF Spiral Inductors, Spiral Inductor Calculations, Exam II (Razavi, 7.1, 7.2)
Week 12:	RF inductors Varactors, Oscillator Basics, (Razavi, 7.3, 7.4, 8.1)
Week 13:	Oscillator Designs, RF Oscillators (Razavi, 8.2, 8.3)
Week 14:	RF, Oscillators, Introduction to Mixers, Exam Razavi, (8.4, 6.1)
Week 15:	Mixers Passive and Active, Example Mixer problems, Design project due (Razavi, 6.2, 6.3)

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 un-mute 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.

Attendance Policy, Class Expectations, and Make-Up Policy

This class will be presented online using Zoom and requires access to a working webcam and stable internet connection. I prefer that students keep their camera on during the class so that I can see you as I would during normal face-to-face classes. Studies show that if we can see each other's faces then we will have more engagement, more student success, and more faculty success. However, this is not a requirement. I understand if on certain days you can't have your camera on due to internet bandwidth limitations, other family members, health issues, or any other reasons.

Excused absences must be consistent with university policies in the undergraduate catalog (https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx) and require appropriate documentation.

Evaluation of Grades

Undergraduate Exams, Laboratories and Homework will be less difficult than Exams, Laboratories, and Homework given in the graduate sections.

Since the is no TA or grader for the course, the homework will be checked off with a grade based on successful problem work completion. Not on problem solution details. It will be your responsibility to correct your homework using the solutions sets handed out in class.

There will be Canvas quizzes if online attendance is low. The quiz percentage of your grade will be transferred over to the exam percentage if the quizzes are not needed.

Assignment	Total Points	Percentage of Final Grade
Homework Sets (10)	5 each	10%
Quizzes (4)	1 to 4 pts each	0% (no quizzes) or 5% (quizzes given if there is low online attendance)
Project	20	20%

Exam 1	100	23% (no quizzes) or 21% if there are quizzes
Exam 2	100	23% (no quizzes) or 22% if there are quizzes
Exam 3	100	24% (no quizzes) or 22% if there are quizzes
		100%

Grading Policy

I will look carefully at each individual's class work accomplishments..

Percent	Grade	Grade Points
92.5 - 100	A	4.00
90.0 – 92.4	A-	3.67
87 - 89.9	B+	3.33
83.0 - 86.9	B	3.00
80.0 – 82.9	B-	2.67
77.0 - 79.9	C+	2.33
73.0 - 76.9	C	2.00
70.0 – 72.9	C-	1.67
67.0 - 69.9	D+	1.33
63.0 - 66.9	D	1.00
60.0 – 62.9	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/.

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/) 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
• 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 suppor*t*, 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.