Cover Sheet: Request 10595

EEE4425 RF/Microwave Passive Circuits

Info

Process	Course|New|Ugrad/Pro
Status	Pending
Submitter	Edvardsson, Laurie laurie@ece.ufl.edu
Created	12/3/2015 10:17:17 AM
Updated	2/9/2016 3:27:14 PM
Description	This is a technical elective in the area of microwave and radio-frequency circuits which plays an important role in communication systems.

Actions

Step	Status	Group	User	Comment	Updated
Department	Approved	ENG - Electrical and Computer Engineering 011905000	Fox, Robert M		12/3/2015
No document changes					
College	Approved	ENG - College of Engineering	Caple, Elizabeth		1/21/2016
No document changes					
University Curriculum Committee	Comment	PV - University Curriculum Committee (UCC)	Case, Brandon	Added to February agenda	1/22/2016
No document changes					
University Curriculum Committee	Pending	PV - University Curriculum Committee (UCC)			1/22/2016
No document changes					
Statewide Course Numbering System					
No document changes					
Office of the Registrar					
No document changes					
Student Academic Support System					
No document changes					
Catalog					
No document changes					
College Notified					
No document changes					

Course|New for request 10595

Info

Request: EEE4425 RF/Microwave Passive Circuits
Submitter: Edvardsson, Laurie laurie@ece.ufl.edu
Created: 12/3/2015 10:17:17 AM
Form version: 1

Responses

Recommended Prefix: EEE
Course Level : 4
Number : 425
Lab Code : None
Course Title: RF/Microwave Passive Circuits
Transcript Title: RF/Microwav Pass Circ
Effective Term : Fall
Effective Year: 2016
Rotating Topic?: No
Amount of Credit: 3
Repeatable Credit?: No
S/U Only?: No
Contact Type : Regularly Scheduled
Degree Type: Baccalaureate
Weekly Contact Hours : 003
Category of Instruction : Joint (Ugrad/Grad)
Delivery Method(s): On-Campus
Course Description : Radio frequency (RF)/microwave passive components and circuits such as transmission lines, waveguides, couplers, filters, and resonators.
Prerequisites : EEL3472C(C)
Co-requisites : None
Rationale and Placement in Curriculum : This is a technical elective in the area of microwave and radio-frequency circuits which plays an important role in communication systems.
Course Objectives : Students will be able to describe the concepts of basic RF/microwave passive components and circuits and will be able to design and examine various RF passive circuits using analytical and numerical means.
Course Textbook(s) and/or Other Assigned Reading: a. Title: Microwave Engineering
b. Author: David M. Pozar
c. Publication date and edition: 2005, 3rd Edition, Wiley
d. ISBN number: 0-471-44878-8

Weekly Schedule of Topics : Week Lecture Topic Read

Skim
Impedance Matching
W1 1. Course Introduction, background evaluation 1.1 1.2-1.9
W1 2. Review of transmission line theory 2.1-2.3
W2 3. Left-handed T-line and CRLH T-line
W2 4. Smith Charts 2.4-2.7
W3 5. Impedance matching with Lumped elements 5.1-5.2 5.3
W3 6. Matching with stubs, Single section and multi-section lambda/4 matching 5.2, 5.4-5.5
W4 7. Binominal broadband matching, Chebyshev 5.6-5.7
W4 8. Chebyshev broadband matching and tapered lines 5.7-5.8

5.9

Transmission Lines and Waveguides
W5 9. Rectangular waveguide and its wall loss 3.3, 3.4 3.1-3.2
W5 10. Circular waveguide, Coaxial cables (+connectors etc.) 3.5

W6 Exam #1 Closed book Formula sheet
W6 11. Stripline, microstrip, CPW 3.7-3.8, 3.11 3.9-3.10

S-parameters and S-matrix
W7 12. Impedance concepts 4.1-4.2
W7 13. Scattering matrix (+properties of s-parameters) 4.3
W8 14. Examples of S-parameters 7.1-7.3

Couplers
W8 15. Branch line coupler (90degree hybrid), 180degree hybrid 7.5
7.4
W9 16. Coupled line couplers 7.6-7.8 7.9
W9 17. Signal flow graph 4.5 (optional)
W10 Exam #2 Closed book Formula
Sheet
W10 Term project discussion

Resonators
W11 18. Series and parallel prototype resonators, T-line resonator 6.1-6.2

W11 19. Waveguide cavity resonator 6.3-6.4
W12 20. Dielectric resonator and Excitation of resonators 6.5-6.6

Filters
W12 21. Filter design using insertion loss method 8.3 8.1-8.2
W13 22. Filter transformations 8.4
W13 23. Filter implementations 8.5-8.6

Magnetics
W14 24. Ferrimagnetic materials 9.1
W14 25. Isolator, Phase Shifter, Circulators 9.4-9.6
W15 Term project presentation
W15 Term project presentation
Final Final (Follow school schedule)
Grading Scheme : 10% Homework
30% Computer lab and projects
20% Exam #1
20% Exam #2
20% Final Exam

Tests and projects:
Undergraduates: Exam questions are based on the homework questions and examples in the text book. The topic of projects is the design, simulation of a directional coupler on a specific substrate and a specific frequency such as 2.4GHz WiFi.

Graduates: Some example questions include literature survey on concurrent PCB technology and metamaterial based component design. The topic of projects is the design, simulation of a paper chosen by each individual student.

Homeworks are due at the beginning of the class period.
-10% if turned in after lecture begins

-20% if turned in after lecture ends (up to one business day late)

Instructor(s) : Dr. William Eisenstadt

EEE 4425 RF/Microwave Passive Circuits

1. Catalog Description – (3 credits) Radio frequency (RF)/microwave passive components and circuits such as transmission lines, waveguides, couplers, filters, and resonators.

2. Pre-requisites – EEL 3472C

3. Course Objectives - Students will be able to describe the concepts of basic RF/microwave passive components and circuits and will be able to design and examine various RF passive circuits using analytical and numerical means.

4. Contribution of course to meeting the professional component (ABET only – undergraduate courses) – 1.5 hours of Engineering Science and 1.5 hours of Engineering Design

5. Relationship of course to program outcomes (ABET only undergraduate courses) – EE2, a, b, c, i, k

6. Instructor – Dr. Yong-Kyu Yoon
    a. Office location: 225 Larsen
    b. Telephone: 392-5985
    c. E-mail address: ykyoon@ece.ufl.edu
    d. Class Web site: http://lss.at.ufl.edu (eLearning)
    e. Office hours: Tuesday, Wednesday 1:00 p.m. – 2:00 p.m. or by appointment

7. Teaching Assistant - None

8. Meeting Times and Location - TBD

9. Class/laboratory schedule - 3 class periods each week consisting of 50 minutes each

10. Material and Supply Fees - None

11. Textbooks and Software Required -
    a. Title: Microwave Engineering
    b. Author: David M. Pozar
    c. Publication date and edition: 2005, 3rd Edition, Wiley
    d. ISBN number: 0-471-44878-8

12. Recommended Reading -
    a. Title: Microwave and RF Design
    b. Author: Michael Steer
    c. Publication date and edition: 2010, SciTech Publishing
    d. ISBN number: 978-1891121883
    e. Software: High Frequency Structure Simulator (HFSS, ANSYS Inc.) Manual, Designer (ANSYS Inc.), ADS (Agilent Inc.)

13. Course Outline –

	Impedance Matching	Read	Skim
W1	1. Course Introduction, background evaluation	1.1	1.2-1.9
W1	2. Review of transmission line theory	2.1-2.3	
W2	3. Left-handed T-line and CRLH T-line		
W2	4. Smith Charts	2.4-2.7	
W3	5. Impedance matching with Lumped elements	5.1-5.2	5.3
W3	6. Matching with stubs, Single section and multi-section $\lambda/4$ matching	5.2, 5.4-5.5	
W4	7. Binominal broadband matching, Chebyshev	5.6-5.7	
W4	8. Chebyshev broadband matching and tapered lines	5.7-5.8	5.9
	Transmission Lines and Waveguides		
W5	9. Rectangular waveguide and its wall loss	3.3, 3.4	3.1-3.2
W5	10. Circular waveguide, Coaxial cables (+connectors etc.)	3.5	
W6	**Exam #1**	Closed book	Formula sheet
W6	11. Stripline, microstrip, CPW	3.7-3.8, 3.11	3.9-3.10
	S-parameters and S-matrix		
W7	12. Impedance concepts	4.1-4.2	
W7	13. Scattering matrix (+properties of s-parameters)	4.3	
W8	14. Examples of S-parameters	7.1-7.3	
	Couplers		
W8	15. Branch line coupler (90° hybrid), 180° hybrid	7.5	7.4
W9	16. Coupled line couplers	7.6-7.8	7.9
W9	17. Signal flow graph	4.5	(optional)
W10	**Exam #2**	Closed book	Formula Sheet
W10	**Term project discussion**		
	Resonators		
W11	18. Series and parallel prototype resonators, T-line resonator	6.1-6.2	
W11	19. Waveguide cavity resonator	6.3-6.4	
W12	20. Dielectric resonator and Excitation of resonators	6.5-6.6	
	Filters		
W12	21. Filter design using insertion loss method	8.3	8.1-8.2
W13	22. Filter transformations	8.4	
W13	23. Filter implementations	8.5-8.6	
	Magnetics		
W14	24. Ferrimagnetic materials	9.1	
W14	25. Isolator, Phase Shifter, Circulators	9.4-9.6	
W15	Term project presentation		
W15	Term project presentation		
Final	**Final (Follow school schedule)**	Open book Open note	TBA

14. Attendance and Expectations - This course is co-taught with a graduate level course. Undergraduate students should register for the undergraduate section. Students are expected to attend class lectures and to arrive on time. Cell phones and other electronic devices are to be silenced. No text messaging during class or exams.

    Requirements for class attendance and make-up exams, assignments, and other work in this course are consistent with university policies that can be found in the online catalog at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

15. Grading –

10%	Homework
30%	Computer lab and projects
20%	Exam #1
20%	Exam #2
20%	Final Exam

    Tests and projects:
    Undergraduates: Exam questions are based on the homework questions and examples in the text book. The topic of projects is the design, simulation of a directional coupler on a specific substrate and a specific frequency such as 2.4GHz WiFi. The design topic is covered in class.

    Graduates: Some example questions include literature survey on concurrent PCB technology and metamaterial based component design. The topic of projects is the design, simulation of a paper chosen by each individual student. The graduate student must identify the best architecture and design the appropriate coupler for that architecture.

    Homeworks are due at the beginning of the class period.
    -10% if turned in after lecture begins
    -20% if turned in after lecture ends (up to one business day late)
    An additional reduction of 10 % is applied for every day the homework is late from the due date. Ultimately, after 9 days, no submission is credited.

    Cheating, copying or plagiarism will result in a zero (0) on the assignment and disciplinary action will be pursued.

16. Grading Scale –

A	A-	B+	B	B-	C+	C	C-	D+	D	D-	E
90-100	87-89	83-86	80-82	77-79	73-76	70-72	67-69	63-66	60-62	57-59	0-56

    "A C- will not be a qualifying grade for critical tracking courses. In order to graduate, students must have an overall GPA and an upper-division GPA of 2.0 or better (C or better)." Note: a C- average is equivalent to a GPA of 1.67, and therefore, it does not satisfy this graduation requirement. For more information on grades and grading policies, please visit: https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx

17. Make-Up Exam Policy – If you have a University-approved excuse and arrange for it in advance, or in case of documented emergency, a make-up exam will be allowed and arrangements can be made for making up missed work. University attendance policies can be found at: https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx

    Otherwise, make-up exams will be considered only in extraordinary cases. The student must submit a written petition to the instructor two weeks prior to the scheduled exam and the instructor must approve the petition. Documentation from the Dean of Students, a Physician, or a Judge must be attached to the petition.

18. 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.

    Cheating, copying or plagerism will result in a zero (0) on the assignment and disciplinary action will be pursued.

19. Accommodation for Students with Disabilities – Students requesting classroom accommodation must first register with the Dean of Students Office. That office will provide documentation to the student who must then provide this documentation to the course instructor when requesting accommodation.

20. UF Counseling Services – Resources are available on-campus for students having personal problems or lacking clear career and academic goals. The resources include:
    - UF Counseling & Wellness Center, psychological and psychiatric services, 3190 Radio Rd, 392-1575, online: http://www.counseling.ufl.edu/cwc/Default.aspx,
    - Career Resource Center, Reitz Union, career and job search services, 392-1601.
    - University Police Department, 392-1111 or 911 for emergencies

21. 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.

22. Course Evaluation – Students are expected to provide feedback on the quality of instruction in this course based on 10 criteria. These evaluations are conducted online at: https://evaluations.ufl.edu. Evaluations are typically open during the last two or three weeks

of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at: https://evaluations.ufl.edu/results.