Course Syllabus

EE 3407 Lecture component Fall, 2015 M,W,F 11:00 – 11:50 am WH, Room 311

Instructor: Prof. Jonathan Bredow (Lecture)

Office: Room 522 Nedderman Hall

Office Hours: M,W,F 9:00-9:30am, otherwise by appointment.

Phone: 817-272-3934

Mailbox: Room 549 Nedderman Hall

Email: jbredow@uta.edu

Instructor WWW site: www.uta.edu/ee

Course WWW site: https://elearn.uta.edu/

Required Textbook(s): Fundamentals of Applied Electromagnetics, Ulaby, Michielssen, Ravailoi (6th ed)

Optional material: TBD

Reference Materials: See materials provided on Blackboard.

Course Description: Time varying electric and magnetic fields, displacement current, Maxwell's equations and transverse electromagnetic waves; plane waves in an unbounded medium, waves in media with planar interfaces, boundary conditions, reflection and transmission, plane waves in lossless and lossy media; electromagnetic waves in a bounded medium, guided waves, wave guides, propagation modes; transmission lines, circuit models of transmission lines, transmission line equations, reflection at discontinuities, terminations, transient response, steady state waves on transmission lines, open and short circuited lines, power flow, impedance matching and the Smith chart, antennas. Problems and experimental demonstrations will be covered during recitation and laboratory sessions.

Course Learning Goals/Objectives: Refer to Table 1 at the end of the syllabus

ABET Outcomes coverage in the course: Refer to Table 2 at the end of the syllabus

Attendance Policy:

Drop Policy:

As per University guidelines. See the Registrar's Bulletin or the University Calendar for drop dates.

Tentative Lecture/Topic Schedule (Course Content) and Specific Course Requirements w/Descriptions:

Grade Computation: TBA - week of Sept 1

Policies: Late homeworks, projects and not showing for exams is inexcuseable with-out approval of instructor prior to due date or exam date

Aug. 28 What is electromagnetics and why is it important? ************************************	Δ11σ	28	What is electromagnetics and why is it important?
Sep. 3 The Magnetic Field ** Static fields, time-varying fields and EM waves ** T ** T ** 10 EM wave propagation ** 12 Boundary conditions and reflection of waves ** 14 ** ** ** 17 Transmission lines ** 17 Transmission ince ** 18 Standing waves/reflections on transmission lines ** 21 Impedance matching on transmission lines ** 21 Replanting the mathematical aspects in determining fields ** 7 ** 7 ** 12 EM radiation ** * ** 14 ** * ** 9 Problems ignoring sources ** 12 EM radiation ** 12 EM radiation ** 12 EM a	Hug.		
 Static fields, time-varying fields and EM waves Labor Day EM wave propagation EM wave propagation EM wave propagation Transmission lines Standing waves/reflections on transmission lines Impedance matching on transmission lines Review Exam 1 Relating reflection coefficient to impedance mismatch Relating reflection coefficient to impedance mismatch General mathematical aspects in determining fields Problems containing sources Problems containing sources EM radiation Kadiation characterization for antennas EM radiation Waveguides Waveguides Nov. 2 " " " " Belectrostatic fields " " " Dielectric materials Magnetostatic fields " " " " Image and " " " " Image and " " " " Image and " " " " " " Image and " " " " " " " " Image and " " " " " " " " " " " " " " " " " " "	Sen		
 7 Labor Day 7 Labor Day 8 Evandary 9 Standing waves/reflections and reflection of waves 14 " " " " " " " " " " " " " " " " " " "			•
"10 EM wave propagation "11 Boundary conditions and reflection of waves "14 """"""""""""""""""""""""""""""""""""	"		
 12 Boundary conditions and reflection of waves 14 " " " " " " " " " " " " " " " " " " "	"		•
14 " " " 13 Standing waves/reflections on transmission lines 19 Standing waves/reflections on transmission lines 21 " " 24 Impedance matching on transmission lines 25 Review 28 Exam 1 30 Relating reflection coefficient to impedance mismatch 0ct. 2 " " 7 Problems ignoring sources 9 Problems ignoring sources 9 Problems ignoring sources 12 EM radiation 14 " 15 General mathematical aspects in determining fields 7 Problems ignoring sources 9 Problems ignoring sources 12 EM radiation 14 " 15 Realign reflection for antennas 16 Radiation characterization for antennas 19 Waveguides 21 " 22 Electrostatic fields 30 " 13 Magnetic materials 14 Dielectric materials	"		
 17 Transmission lines 19 Standing waves/reflections on transmission lines 21 " " " " " 24 Impedance matching on transmission lines 26 Review 28 Exam 1 30 Relating reflection coefficient to impedance mismatch Oct. 2 " " " " " " " 31 Relating reflection coefficient to impedance mismatch Oct. 2 " " " " " " " 32 General mathematical aspects in determining fields 37 Problems containing sources 39 Problems containing sources 31 Problems containing sources 31 Problems containing sources 32 EM radiation 33 Radiation characterization for antennas 34 Waveguides 35 Review 36 Electrostatic fields 30 " " " " 31 Review 32 Review 33 Review 34 Electrostatic fields 36 " " " " 37 Mov. 2 " " " " " 38 Electrostatic fields 39 " " " " 30 Magnetic materials 31 Magnetic materials 33 Magnetic materials 34 Dielectric materials 35 Generaling source (C) 36 Magnetostatic fields 37 " " " " " 38 Electrostatic L's and C's in practical components and circuits 33 " " " " " " 34 Electro field components and circuits 35 EM and EMC (FCC and other types of certification) 36 Thanksgiving 37 Overall assessment of applying knowledge of EM to practical problems in design and development 30 Overall assessment of applying knowledge of EM to practical problems in design and development 36 There are a " " " " " " 	"		
21 " " " " " " 22 Impedance matching on transmission lines 23 Review 28 Exam 1 30 Relating reflection coefficient to impedance mismatch Oct. 2 " " " " " " 7 Problems containing sources 9 Problems containing sources 12 EM radiation 14 " " " 16 Radiation characterization for antennas 19 Waveguides 21 " " " 23 Review 24 Electrostatic fields 30 " " " " 23 Review 24 " " " 23 Review 24 " " " 25 Electrostatic fields 30 " " " " 4 Dielectric materials 6 Magnetic materials 7 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " 23 Parasitic L's and C's in practical components and circuits 23 " " " " "	"		Transmission lines
21 " " " " " " 22 Impedance matching on transmission lines 23 Review 28 Exam 1 30 Relating reflection coefficient to impedance mismatch Oct. 2 " " " " " " 7 Problems containing sources 9 Problems containing sources 12 EM radiation 14 " " " 16 Radiation characterization for antennas 19 Waveguides 21 " " " 23 Review 24 Electrostatic fields 30 " " " " 23 Review 24 " " " 23 Review 24 " " " 25 Electrostatic fields 30 " " " " 4 Dielectric materials 6 Magnetic materials 7 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " 23 Parasitic L's and C's in practical components and circuits 23 " " " " "	"	19	Standing waves/reflections on transmission lines
 Review Review Relating reflection coefficient to impedance mismatch Relating reflection coefficient to impedance mismatch Relating reflection coefficient to impedance mismatch T """"""""""""""""""""""""""""""""""""	"	21	
"28 Exam 1 "30 Relating reflection coefficient to impedance mismatch Oct. 2 """"""""""""""""""""""""""""""""""""	"	24	Impedance matching on transmission lines
 30 Relating reflection coefficient to impedance mismatch Oct. 2 " " " " " " " 5 General mathematical aspects in determining fields 7 Problems containing sources 9 Problems ignoring sources 12 EM radiation 14 " " " 16 Radiation characterization for antennas 19 Waveguides 21 " " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " 4 Dielectric materials 6 Magnetostatic fields 9 " " " 13 Magnetic materials 14 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 24 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 4 Neview 	"		Review
Oct. 2 " " " " " ". 5 General mathematical aspects in determining fields ". 7 Problems ignoring sources ". 12 EM radiation ". 14 " " ". 16 Radiation characterization for antennas ". 16 Radiation characterization for antennas ". 16 Radiation characterization for antennas ". 17 Waveguides ". 23 Review ". 23 Review ". 26 Exam 2 ". 18 Electrostatic fields ". 0 " " " " Y 4 Dielectric materials ". 11 " " " " ". 13 Magnetiostatic fields ". 13 Magnetior materials ". 13 Magnetiostatic components and circuits ". 20 Parasitic L's and C's in practical components and circuits ". 25 EMI and EMC (FCC and other types of certification) ". " " " " "	"		Exam 1
Vector 2 General mathematical aspects in determining fields "7 Problems containing sources "9 Problems ignoring sources "12 EM radiation "14 " "12 EM radiation characterization for antennas "14 " "15 Radiation characterization for antennas "16 Radiation characterization for antennas "19 Waveguides "21 " "23 Review "24 Electrostatic fields "30 " " "4 Dielectric materials "5 Magnetostatic fields "9 " " "11 " " "4 Dielectric materials " "13 Magnetic materials " "13 Magnetic materials " "23 " " " "30 Parasitic L's and C's in practical components and circuits " "31 Magnetic materials " "4 " " " <td>"</td> <td></td> <td></td>	"		
 Problems containing sources 9 Problems ignoring sources 12 EM radiation 14 " " " 16 Radiation characterization for antennas 19 Waveguides 21 " " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " " 7 Dielectric materials 6 Magnetostatic fields 9 " " " " 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 29 " " " " " 20 Parasitic L's and C fCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 			
 Problems ignoring sources 12 EM radiation 14 " " 16 Radiation characterization for antennas 19 Waveguides 21 " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " 30 " " " 7 4 Dielectric materials 6 Magnetostatic fields 9 " " " " 11 " " " 13 Magnetic materials 6 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 21 " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 	•		
 12 EM radiation 14 " " " 16 Radiation characterization for antennas 19 Waveguides 21 " " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " 70 Vov 2 10 " " " 11 " " " 12 Magnetostatic fields 9 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 77 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 			
 14 " " 14 Radiation characterization for antennas 19 Waveguides 21 " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " 4 Dielectric materials 6 Magnetostatic fields 9 " " " 11 " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 7 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 4 " " " " " " 			
 Radiation characterization for antennas Waveguides 21 " " " 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " 30 " " " " 4 Dielectric materials 6 Magnetostatic fields 9 " " " " 11 " " " " 13 Magnetic materials 6 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 7 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 			
 ⁿ 19 Waveguides ⁿ 21 " " ⁿ 23 Review ⁿ 26 Exam 2 ⁿ 28 Electrostatic fields ⁿ 30 " " " " ⁿ 0 " " " ⁿ 0 Dielectric materials ⁿ 6 Magnetostatic fields ⁿ 9 " " " ⁿ 11 " " " ⁿ 13 Magnetic materials ⁿ 16 Inductance (L) and capacitance (C) ⁿ 18 " " " " " ⁿ 20 Parasitic L's and C's in practical components and circuits ⁿ 25 EMI and EMC (FCC and other types of certification) ⁿ 27 Thanksgiving ⁿ 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? ⁿ 7 Review 			
 " 21 " " " " 23 Review " 26 Exam 2 " 28 Electrostatic fields " 30 " " " " " 4 Dielectric materials " 6 Magnetostatic fields " 9 " " " " " 11 " " " " " 13 Magnetic materials " 6 Inductance (L) and capacitance (C) " 18 " " " " " " 20 Parasitic L's and C's in practical components and circuits " 23 " " " " " 25 EMI and EMC (FCC and other types of certification) " 27 Thanksgiving " 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " 7 Review 			
 Review 23 Review 26 Exam 2 28 Electrostatic fields 30 " " " " 30 " " " " 4 Dielectric materials 6 Magnetostatic fields 9 " " " " 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 			
 26 Exam 2 28 Electrostatic fields 30 " " " " 30 Dielectric materials 31 Magnetostatic fields 32 " " " " 33 Magnetic materials 34 Inductance (L) and capacitance (C) 36 Inductance (L) and capacitance (C) 37 Thanksgiving 30 Parasitic L's and C's in practical components and circuits 30 " " " " " 31 Overall assessment of applying knowledge of EM to practical problems in design and development 36 Dec. 2 What other topics of study might build on fundamental knowledge of EM? 37 Review 			
"28 Electrostatic fields "30 """"""""""""""""""""""""""""""""""""			
"30 """"""""""""""""""""""""""""""""""""			
Nov. 2""""4Dielectric materials"6Magnetostatic fields"9""11""11""13Magnetic materials"16Inductance (L) and capacitance (C)"18""20Parasitic L's and C's in practical components and circuits"23""25EMI and EMC (FCC and other types of certification)"27Thanksgiving"30Overall assessment of applying knowledge of EM to practical problems in design and developmentDec.2What other topics of study might build on fundamental knowledge of EM?"4""7Review			
 4 Dielectric materials 6 Magnetostatic fields 9 " " " " 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 	Nov		
 Magnetostatic fields 9 " " " " 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 7 Review 			Dielectric materials
 9 " " " " 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " " " " " " 			
 11 " " " " 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 4 " " " " " 	"		
 13 Magnetic materials 16 Inductance (L) and capacitance (C) 18 " " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? 4 " " " " " 	"		и и и
 Inductance (L) and capacitance (C) 18 """"""""""""""""""""""""""""""""""""	"		Magnetic materials
 18 " " " " " " " " 20 Parasitic L's and C's in practical components and circuits 23 " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " " " " " " " 7 Review 	"		
 Parasitic L's and C's in practical components and circuits 23 " " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " 4 " " " " " " " 7 Review 	"		
 23 " " " " " " 25 EMI and EMC (FCC and other types of certification) 27 Thanksgiving 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " 4 " " " " " " 7 Review 	"		Parasitic L's and C's in practical components and circuits
 Thanksgiving Overall assessment of applying knowledge of EM to practical problems in design and development What other topics of study might build on fundamental knowledge of EM? 4 " " " " " 7 Review 	"	23	
 30 Overall assessment of applying knowledge of EM to practical problems in design and development Dec. 2 What other topics of study might build on fundamental knowledge of EM? " 4 " " " " " " 7 Review 	"	25	EMI and EMC (FCC and other types of certification)
Dec. 2 What other topics of study might build on fundamental knowledge of EM? 4 " " " " " " " " " " " " " " " " " " "	"		
" 4 " " " " " " " 7 Review	"		
" 7 Review			What other topics of study might build on fundamental knowledge of EM?
/ Kevlew			
" 9 " "			
	"	9	

Final Exam: Wednesday Dec 16 11:00 am - 1:30 pm

Lab Schedule TBA Week beginning with Mo

Week beginning with Monday	Topic
XXX	XXX

XXX	XXX
XXX	XXX

If you require an accommodation based on disability, I would like to meet with you in the privacy of my office, during the first week of the semester, to make sure you are properly accommodated.

Student Evaluation of Teaching

Students will be asked to complete instructor/course evaluation forms at the end of the semester.

Americans with Disabilities Act:

The University of Texas at Arlington is on record as being committed to both the spirit and letter of federal equal opportunity legislation; reference Public Law 93112—The Rehabilitation Act of 1973 as amended. With the passage of new federal legislation entitled Americans with Disabilities Act – (ADA), pursuant to section 504 of The Rehabilitation Act, there is renewed focus on providing this population with the same opportunities enjoyed by all citizens.

As a faculty member, I am required by law to provide "**reasonable accommodation**" to students with disabilities, so as not to discriminate on the basis of that disability. Student responsibility primarily rests with **informing faculty at the beginning of the semester and in providing authorized documentation through designated administrative channels.**

Academic Dishonesty

It is the philosophy of The University of Texas at Arlington that academic dishonesty is a completely unacceptable mode of conduct and will not be tolerated in any form. All persons involved in academic dishonesty will be disciplined in accordance with University regulations and procedures. Discipline may include suspension or expulsion from the University.

"Scholastic dishonesty includes but is not limited to cheating, plagiarism, collusion, the submission for credit of any work or materials that are attributable in whole or in part to another person, taking an examination for another person, any act designed to give unfair advantage to a student or the attempt to commit such acts." (Regents' Rules and Regulations, Part One, Chapter VI, Section 3, Subsection 3.2, Subdivision 3.22).

ANY CHEATING WILL RESULT IN SEVERE PENALTIES.

Table 1: Statements of Course Objectives

Student is expected to demonstrate:	ABET Outcome mapping
Understanding of many ways in which electromagnetics describes/impacts behaviors and functionality of modern electronic circuits and	c, e, j
systems.	
Ability to effectively design using transmission lines in practical low and high frequency electrical and electronic systems.	a, c, e
Ability to design simple impedance matching circuits for high frequency circuits and systems.	c, k
Fundamental understanding of EM radiation from intentional and unintentional sources.	a, e
Understanding of EM behaviors of dielectric and magnetic materials.	a, e
Ability to use modern instruments for characterizing EM systems, including VNA, spectrum analyzer and simple optical sources and power meters.	k
Demonstrate quantitative understanding of simple electromechanical systems in terms of forces associated with electric charges and currents.	a, e
Ability to analyze fields produced by a system of charges and currents.	A,e

Table 2: Coverage of ABET outcomes

ABET Outcome	Primary course component	Weight
(a) an ability to apply	Exams, Homeworks, Projects	High
knowledge of mathematics,		
science, and engineering		
(b) an ability to design and	Lab	Moderate
construct experiments, as well		
as to analyze and interpret		
data		
(c) an ability to design system,	Exams, Homeworks, Projects,	High
component, or process to meet	Labs	
desired needs		
(d) an ability to function on	Lab	Low
multidisciplinary teams		
(e) an ability to identify,	Exams, Homeworks, Projects,	High
formulate, and solve	Labs	
engineering problems;		
(f) an understanding of	Not addressed	Not addressed
professional and ethical		
responsibility		
(g) an ability to communicate	Projects, Labs	Moderate for written
effectively		communication
(h) the broad education	Not addressed	Not addressed
necessary to understand the		
impact of engineering		
solutions in a global and		
societal context		
(i) a recognition of the need	Projects	Low
for, and an ability to engage in		
lifelong learning		
(j) a knowledge of	Not addressed	Not addressed
contemporary issues		
(k) an ability to use the	Projects, Labs	High
techniques, skills, and modern		
engineering tools necessary		
for engineering practice	Evene Hereworks	L eu:
(l) an ability to apply	Exams, Homeworks	Low
probability and statistics,		
including applications		
appropriate to electrical		
engineering		