Fall 2017 - Syllabus

EENG 3410 - Engineering Electromagnetics

Class meetings B242, Tuesday and Thursday 1 pm – 2:20 pm

Description

Electromagnetic theory as applied to electrical engineering: vector calculus; electrostatics and magnetostatics; Maxwell's equations, including Poynting's theorem and boundary conditions; uniform plane-wave propagation; transmission lines – TEM modes, including treatment of general, lossless line and pulse propagation; introduction to guided waves; introduction to radiation and scattering concepts. Credit hours: 3 hrs.

Prerequisite(s): EENG 2610, MATH 3310.

Instructor

Ifana Mahbub, Assistant Professor, Electrical Engineering Department
Office B208, Email Ifana.Mahbub@unt.edu, Office hours: Tuesday and Thursday 3:30 pm – 4:30 pm or by appointment.

Teaching Assistant

Han Ren, Ph.D. Student
Office B251, Email hanren@my.unt.edu, Office hours: Tuesday and Thursday 2:30 pm – 3:30 pm or by appointment.

Format

• Lectures, based on textbook
• Online: announcements, grades via Blackboard learn https://learn.unt.edu

Grade

Home works: 15%
Quizzes: 20%
Mid-term test 1: 20%
Mid-term test 2: 20%
Final Exam 25%

Grade distribution

A=90-100, B=80-89, C=70-79, D=60-69, F=0-59

Schedules of exams

Final: According to UNT exam schedule: December 14, 10:30 am – 12:30 pm
http://registrar.unt.edu/exams/final-exam-schedule

Textbooks

Required: by William H. Hayt Jr. and John, A. Buck, 2012. Engineering Electromagnetics, Eighth Edition, Mcgraw- Hill. ISBN: 978-0-07-338066-7
Optional: Fundamentals of Applied Electromagnetics, 6th or 7th Edition, Fawwaz T. Ulaby, Eric Michielssen and Umberto Ravaioli, Prentice Hall, 2014.

Class Evaluation by Students

Student Perceptions of Teaching (SPOT) is a requirement for all organized classes at UNT and is available for your input at the end of the semester.

Topics

- Vector Analysis, Chapter 1, sections 1.1 – 1.7
- Coulomb's law and Electric Field Intensity, Chapter 2, sections 2.1 – 2.4
- Electric Flux Density, Gauss's law, and Divergence, Chapter 3, sections 3.1 – 3.6
- Energy and Potential, Chapter 4, sections 4.1 – 4.6
- Conductor's and Dielectrics, Chapter 5, sections 5.1 – 5.4
- Capacitance, Chapter 6, sections 6.1, 6.2, 6.5, 6.6
- The Steady Magnetic Field, Chapter 7, sections 7.1 – 7.5
- Magnetic Forces, Materials, and Inductance, Chapter 8, sections 8.1 – 8.4, 8.10
- Time-Varying Fields and Maxwell's Equations, Chapter 9, sections 9.1-9.4
- Transmission Lines, Chapter 10, sections 10.1-10.14
- The Uniform Plane Wave, Chapter 11, sections 11.1-11.5
- Plane Wave Reflection and Dispersion, chapter 12, sections 12.1 – 12.7
- Guided Waves, chapter 13,sections 13.1 -13.6
- Electromagnetic Radiation and Antennas, chapter 14, sections 14.1 – 14.3

Course Learning Outcomes (CLO):

Upon successful completion of this course, the students will be able to:

1. Understand the basic properties of transmission lines and analyze electromagnetic wave propagation in generic transmission line geometries.
2. Understand the meaning of divergence and curl; be able to calculate line integrals, surface and volume integrals.
3. Use Gauss's Law, Coulomb's law and Poisson's Equations to find fields and potentials for a variety of situations including charge distributions and capacitors.
4. Use numerical methods to solve for electric fields from charge distributions and conducting boundaries.
5. Understand the behavior of magnetic and electric fields in the presence of dielectric and magnetic materials; appreciate how to simply modify expressions for capacitance and inductance from free space expressions.
6. Understand the behavior of magnetic and electric fields in the presence of dielectric and magnetic materials.
7. Understand Maxwell's Equations for time-harmonic fields and the boundary conditions across media boundaries.
8. Analyze electromagnetic wave propagation and attenuation in various medium and propagation through boundaries between media.
9. Several homework assignments delving on core concepts and reinforcing analytical skills learned in class.
10. Opportunities to interact weekly with the instructor and the teaching assistant during regular office hours and discussion sections in order to further the students' learning experience and the students' interest in the material.

ABET Student Learning Outcomes (SO)

SO-1 Ability to apply mathematics, science and engineering principles.
SO-2 Ability to design and conduct experiments, analyze and interpret data.
SO-3 Ability to design a system, component, or process to meet desired needs.
SO-4 Ability to function on multidisciplinary teams.

SO-5 Ability to identify, formulate and solve engineering problems.
SO-6 Understanding of professional and ethical responsibility.
SO-7 Ability to communicate effectively.
SO-8 The broad education necessary to understand the impact of engineering solutions in a global and societal context.
SO-9 Recognition of the need for and an ability to engage in life-long learning.
SO-10 Knowledge of contemporary issues.
SO-11 Ability to use the techniques, skills and modern engineering tools necessary for engineering practice.

CLO	**ABET Student Outcomes**										
	SO-1	SO-2	SO-3	SO-4	SO-5	SO-6	SO-7	SO-8	SO-9	SO-10	SO-11
1	X			X							
2	X										X
3	X										X
4	X				X						X
5	X										
6	X				X						
7	X			X							
8	X		X								
9	X								X		
10									X		

Policies

Grades: All grades for the course will be final. No extra credit assignments or work will be considered after the final grade has been recorded.

Accommodations: The EE Department in cooperation with the Office of Disability Accommodation complies with the Americans with Disabilities Act in making reasonable accommodations for qualified students with disabilities. Please present your written accommodation request before the 12th class day.

Academic Dishonesty: Students caught cheating, plagiarizing, or any other academic dishonesty will be subject to penalty according to the new Policy on Students Standards on Academic Integrity. See full policy at http://www.unt.edu/policy/UNT_Policy/volume3/18_1_16.pdf

According to this policy the categories of academic dishonesty are:

A. Cheating. The use of unauthorized assistance in an academic exercise, including but not limited to:
    a. use of any unauthorized assistance to take exams, tests, quizzes or other assessments;
    b. dependence upon the aid of sources beyond those authorized by the instructor in writing papers, preparing reports, solving problems or carrying out other assignments;
    c. acquisition, without permission, of tests, notes or other academic materials belonging to a faculty or staff member of the University;
    d. dual submission of a paper or project, or re-submission of a paper or project to a different class without express permission from the instructor;
    e. Any other act designed to give a student an unfair advantage on an academic assignment.
B. Plagiarism. Use of another's thoughts or words without proper attribution in any academic

exercise, regardless of the student's intent, including but not limited to:

a. The knowing or negligent use by paraphrase or direct quotation of the published or unpublished work of another person without full and clear acknowledgement or citation.
b. The knowing or negligent unacknowledged use of materials prepared by another person or by an agency engaged in selling term papers or other academic materials.

C. Forgery. Altering a score, grade or official academic university record or forging the signature of an instructor or other student.
D. Fabrication. Falsifying or inventing any information, data or research as part of an academic exercise.
E. Facilitating Academic Dishonesty. Helping or assisting another in the commission of academic dishonesty.
F. Sabotage. Acting to prevent others from completing their work or willfully disrupting the academic work of others.

Tentative Course Calendar

A.

Week	Date	Topics	Reading
1	08/29	Vector Analysis	Ch. 1: 1.1 -1.7
	08/31	Coulomb's law and Electric Field Intensity	Ch. 2: 2.1 -2.4
2	09/05	Electric Flux Density	Ch. 3: 3.1-3.3
	09/07		
3	09/12	Gauss's law and Divergence	Ch. 3: 3. 4 – 3.6
	09/14		
4	09/19	Energy and Potential	Ch. 4: 4.1-4.3
	09/21		Ch. 4: 4.4 -4.6
5	09/26	Conductors and Dielectrics	Ch. 5: 5.1 – 5.4
	09/28	Review	
6	10/03	Exam #1	
	10/05	Capacitance	Ch. 6: 6.1, 6.2, 6.5,6.6, 6.8
7	10/10	The Steady Magnetic Field	Ch. 7: 7.1 -7.3
	10/12		Ch. 7: 7.4 – 7.5
8	10/17	Magnetic Forces, Materials, and Inductance	Ch. 8: 8.1 – 8.2
	10/19		Ch. 8: 8.3, 8.4,8.10
9	10/24	Time-Varying Fields and Maxwell's Equations	Ch. 9: 9.1 – 9.2

	10/26	Exam #2/Lecture	Ch. 9: 9.3 -9.4
10	10/31	The Uniform Plane Wave	Ch. 11: 11.1 -11.2
	11/02		Ch.11: 11.3 – 11.5
11	11/07	Transmission Lines	Ch. 10: 10.1 – 10.4
	11/09		Ch. 10: 10.5 – 10.8
12	11/14		Ch. 10: 10.9 – 10.14
	11/16	Plane Wave Reflection and Dispersion	Ch. 12: 12.1 -12.4
13	11/21		Ch. 12: 12.5 -12.6
	11/23	Thanksgiving Break	
14	11/28	Guided Waves	Ch. 13: 13.1-13.4
	11/30	Mutual Inductance	Ch. 13: 13.5 -13.6
15	12/05	Electromagnetic Radiation and Antenna	Ch. 14: 14.1 -14.3
	12/07	Review	
	12/14	Final Exam: December 14 10:30 am – 12:30 pm	