

Fall 2025 - Syllabus

## **EENG 3410 - Engineering Electromagnetics**

Class meetings B142, 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**

Sensong An, Assistant Professor, Electrical Engineering Department

Office E255A, Email Sensong.An@unt.edu, Office hours: by appointment.

### **Teaching Assistant**

TBD

### **Format**

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

### **Grade**

Home works: 30%

Quizzes: 20%

Mid-term test: 30%

Final Exam 30%

### **Grade distribution**

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

### **Schedules of exams**

Midterm:

Final: According to UNT exam schedule: TBD

<http://registrar.unt.edu/exams/final-exam-schedule>

## Textbooks

Required: by Matthew Sadiku. Elements of Electromagnetics (The Oxford Series in Electrical and Computer Engineering) 7th Edition

Optional: Microwave Engineering 4th Edition, David M. Pozar.

## 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 Algebra, Chapter 1, sections 1.1 – 1.7
- Coordinate Systems and Transformation, Chapter 2, sections 2.1 – 2.4
- Vector Calculus, Chapter 3, sections 3.1 – 3.7
- Electrostatic Fields, Chapter 4, sections 4.1 – 4.10
- Electric Fields in Material Space, Chapter 5, sections 5.1 – 5.9
- Electrostatic Boundary Value Problems, Chapter 6, sections 6.1 – 6.5
- Magnetostatic Fields, Chapter 7, sections 7.1 – 7.7
- Magnetic Forces, Materials, and Devices, Chapter 8, sections 8.1 – 8.10
- Maxwell's Equations, Chapter 9, sections 9.1-9.7

## 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](http://www.unt.edu/policy/UNT_Policy/volume3/18_1_16.pdf)

According to this policy the categories of academic dishonesty are:

1. 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.
2. Plagiarism. Use of another's thoughts or words without proper attribution in any academic
3. Forgery. Altering a score, grade or official academic university record or forging the signature of an instructor or other student.
4. Fabrication. Falsifying or inventing any information, data or research as part of an academic exercise.
5. Facilitating Academic Dishonesty. Helping or assisting another in the commission of academic dishonesty.
6. Sabotage. Acting to prevent others from completing their work or willfully disrupting the academic work of others.

### Tentative Course Calendar

Week	Topics	Reading
1	Introduction Vector Algebra	1.1-1.7
	Coordinate System and Transformations Base Vectors	2.1-2.4
2	Contours, Surfaces and Volume Del Operator	3.1-3.4
	Gradient Divergence Curl	3.5-3.7
3	Divergence Theorem Stokes' Theorem	3.6-3.7
	Electric Charge Coulomb's Law Electric Field	4.1-4.2
4	Charge Density Line/Surface/Volume Charge	4.3
	E-field Lines Electric Flux	4.3-4.4
5	Gauss's Law	
	Electric Potential Relationship between $\vec{E}$ and $V$	

6	Conduction and Convection Current Dielectrics and Conductors	4.5
	Ohm's Law and Resistors Polarization	4.7-4.8
7	Poisson's and Laplace's Equation Boundary-Value Problems	5.1-5.3
	Capacitance in Boundary-Value Problem Resistance in Boundary-Value Problems	5.4-5.6
8	Electrostatics Review	6.1-6.2
	<b>Mid-Term Exam</b>	6.4-6.5
9	<b>Spring Break</b>	
	<b>Spring Break</b>	
10	Biot-Savart's Law	7.1-7.2
	Ampere's Circuit law Magnetic Flux Density	7.3-7.5
11	Magnetic Potential	7.7
	Forces due to Magnetic Fields	8.1-8.2
12	Magnetic Torque and Moment	8.3
	Magnetic Dipole	8.4
13	Magnetization	8.5
	Magnetic Boundary Condition	8.7
14	Faraday's Law	9.1-9.3
	Displacement Current	9.4
15	Maxwell's Equations	9.5
	Time-varying Potentials	9.6
16	Time-harmonic Field	9.7
	Special topic: wave-particle duality	

17	Magnetostatics Review	
	<b>Final Exam</b>	