The University of Texas at Tyler
Department of Electrical Engineering

EENG 3303 – Electromagnetic Fields (Required)

Syllabus

Catalog Description:

> Vector analysis; static electric field; steady electric currents; static magnetic fields; time varying fields and Maxwell's equations; plane electromagnetic waves; transmission lines; introduction to waveguides; introduction to antennas.

Prerequisites: MATH 3404, MATH 3305, PHYS 2326, and PHYS 2126

Credits: 3 (3 hours lecture, 0 hours laboratory per week)

Text(s): (Required)
1. Elements of Electromagnetics by Matthew N. O. Sadiku, Seventh Edition, Oxford University Press

Additional Material: (Recommended)

Reference(s):
1. Matlab®
2. Instructor's lecture notes

Course Coordinator: Seyed Ghorshi, PhD

Topics Covered:
1. Vector Analysis
2. Static Electric Fields
3. Steady Electric Currents (Circuit Theory)
4. Static Magnetic Fields
5. Time Varying Fields
6. Maxwell Equations
7. Electromagnetic Waves
8. Introduction to Transmission Lines, Antennas, and Waveguides

Evaluation Methods: (only items in dark print apply):
1. Examinations / Quizzes
2. Homework
3. Report
4. Computer Programming
5. Project
6. Presentation
7. Course Participation
8. Peer Review

Course Learning Outcomes (formerly Objectives)[1]: By the end of this course students will be able to:
1. Formulate the electric field and potential expressions due to various charge distributions [1]
2. Calculate electrostatic energy and capacitance due to various charge distributions [1]
3. Solve static electric field problems using analytical techniques [1]
4. Solve static magnetic field problems using analytical techniques [1]
5. Formulate a boundary value problem in electromagnetic fields [1,4,5]
6. Solve a boundary value problem in electromagnetic fields [1,4,5]
7. Solve a 2-D electrostatic problem using a numerical technique
8. Write and present a report on the solution of a 2-D electrostatic problem using experimental, analytical, and numerical techniques [3]

9. Use modern engineering tools including modeling and simulation software [3,4,5]
10. Develop the principles of time-varying fields and Maxwell's equations [1]
11. Solve Maxwell for uniform plane waves [1]
12. Write a paper on the impact of electromagnetics on society [3]
13. Develop transmission lines distributed model [1]

1Numbers in brackets refer to method(s) used to evaluate the course objective.

Relationship to Student Outcomes (only items in dark print apply)[2]: This course supports the following Electrical Engineering Student Outcomes, which state that our students will possess:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics; [1, 5, 6, 10, 11,13]
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors; [2, 3, 4, 8]
3. an ability to communicate effectively with a range of audiences;
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts; [12]
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions; [7, 9, 10]
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

2Numbers in brackets refer to course learning outcomes/objective(s) that address the Program Outcome.

Contribution to Meeting Professional Component: (in semester hours)

Mathematics and Basic Sciences:	0	hours
Engineering Sciences and Design:	3.0	hours
General Education Component:	0	hours

Prepared By:	Hassan El-Kishky	Date:	07/15/2011
Modified:	Seyed Ghorshi	Date:	08/22/2018
			08/24/2019
			05/28/2020