

**The University of Texas at Tyler
Department of Electrical Engineering**

Course: 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 3304, MATH 3305, and PHYS2326, and PHYS2126

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

Text(s):
(Required) 1. Field and Wave Electromagnetics, 2nd edition, David Cheng,

Additional
Material:
(Recommended)

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

Course Coordinator: Hassan El-Kishky, PhD, PE

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. Reports / Paper
4. Computer Programming
5. Project / Model
6. Presentation
7. Course Participation *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 Program Outcomes (only items in dark print apply)²: This course supports the following Electrical Engineering Program Outcomes, which state that our students will:

1. have the ability to apply knowledge of the fundamentals of mathematics, science, and engineering. [1,10,11,13]
2. have the ability to use modern engineering tools and techniques in the practice of electrical engineering. [7,9]
3. have the ability to analyze electrical circuits, devices, and systems [5,6]
4. have the ability to design electrical circuits, devices, and systems to meet application requirements.
5. have the ability to design and conduct experiments, and analyze and interpret experimental results [10]
6. have the ability to identify, formulate, and solve problems in the practice of electrical engineering using appropriate theoretical and experimental methods. [2,3,4,8]
7. have effective written, visual, and oral communication skills. [12]
8. possess an educational background to understand the global context in which engineering is practiced, including
 - a. knowledge of contemporary issues related to science and engineering.
 - b. the impact of engineering on society. [12]
 - c. the role of ethics in the practice of engineering.
9. have the ability to contribute effectively as members of multi-disciplinary engineering teams.
10. have a recognition of the need for and ability to pursue continued learning throughout their professional careers.

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:	0.5	hours
Engineering Sciences and Design:	2.5	hours
General Education Component:	0	hours

Prepared By:

Hassan El-Kishky

Date:

07/15/2011

Modified:

Hassan El-Kishky

Date:

08/16/2012

Ron Pieper

08/25/2013

09/10/2014

08/20/2018