The University of Texas at Tyler
Department of Electrical Engineering
Houston Engineering Campus

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 by David K. Cheng, Second Edition, Pearson
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]

[1] *Numbers 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.

[2] *Numbers 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:	Seyed Ghorshi	Date:	08/22/2018

EENG 3303 ELECTROMAGNETIC FIELDS, Fall, 2018,

Class Time: 12:30 – 1:50PM MW
Location: A217

Coordinator: Seyed Ghorshi
Email: aghorshi@uttyler.edu

Office Hours: times (to be announced) And by appointment.

Textbook: Field and Wave Electromagnetics, (second edition), (A David Cheng

Contents: The goal of this course is to provide the student with the fundamentals of the classical theory of electromagnetics. 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.

Prequisites: MATH 3304, MATH 3305, and PHYS2326, and PHYS2126,
Own a scientific **non** programmable calculator.

Course Content:

Introduction
Vectors
Static electric fields
Poisson and Laplace
Electric current
Static magnetic fields
Maxwell's equations
Plane Waves
Transmission lines
Waveguides, Cavities
Antennas

Tentative Grading:
HW/project 10%
Midterm exam 40%
Final Exam 50%

* Can include cases in which a turn in "problem" done by student will count.. Not excluding possible assignment of tasking student to provide description/short report for a technical paper with significant content based on Electromagnetics
[*] Start a spiral or bound notebook, to record your work on HW problems assigned. Start working the problems without the benefit of posted solutions. If you get stuck, which is expected to happen to one degree or another, make a note point in logic stream you reached impasse then go onto next problem. Sometimes you won't know where to begin and again make a note of that. If stuck you are encouraged to take out as much as 5-10 minutes and review notes and text before going to next problem. The notebook will be expected to show you have along the way made some wrong turns in your analysis and not expected to be perfect solutions the first time. (Be warned if your midterm performance is significantly below average you may be asked to provide your notebook in an effort to advise on corrective action)

**Students are required to combine both mathematical analysis and numerical computation using a computer technical calculation package such as MATLAB or any high-level computer programming language that applies to the case-study.

Notes will be placed on blackboard for advance printing (department policy prevents me from printing notes for the class except in unusual circumstances)

Perquisites: MATH 3304, MATH 3305, and PHYS2326, and PHYS2126, EENG 3304
(junior or higher in EE program, taken circuits EE3304 & Matlab) Own a scientific **non** programmable calculator.

Equation references for exams and quizzes will be made available prior to quizzes and exams. Also to provide safety net for philosophy there are quite often multiple ways to a obtain the solution students will be allowed to prepare and have available there own equation set within limited space (and no micro fische readers)

OTHER COMMENTS: Turn off cell phones during class. Please keep any discussions not related to EE3303 topics for times outside schedule EENG 3303 class periods.

Academic Integrity:
Students should be aware that absolute academic integrity is expected of every student in all undertakings at The University of Texas at Tyler. Failure to comply can result in strong university-imposed penalties.

Note:
If you have a disability, including a learning disability, for which you request disability support services/accommodation(s), please contact the Disability Support Services office so that the appropriate arrangements may be made. In accordance with federal law, a student requesting disability support services/accommodation(s) must provide appropriate documentation of his/her disability to the Disability Support Services counselor. In order to assure approved services the first week of class, diagnostic, prognostic, and prescriptive information should be received 30 days prior to the beginning of the semester services are requested. For more information, call or visit the Student Services Center located in the University Center, Room 282. The telephone number is 566-7079 (TDD 565-5579)." Additional information may also be obtained at the following UT Tyler Web address: http://www.uttyler.edu/disabilityservices.

Grade Replacement Policy:
If you are repeating this course for a grade replacement, you must file an intent to receive grade forgiveness with the registrar by the 12th day of class. Failure to file an intent to use grade forgiveness will result in both the original and repeated grade being used to calculate your overall grade point average. A student will receive grade forgiveness (grade replacement) for only three (undergraduate student) or two (graduate student) course repeats during his/her career at UT Tyler. (2006-08 Catalog, p. 35)

RE availability Matlab. University of Texas at Tyler EE Department has a site license for use strictly on site. IT policy prohibits placing this software on personal computers. If you are interested in having student version of the software (Matlab cum Simulink) on your laptop and/or home computer during the semester you can contact one of two sources (customer service for Mathworks 508-647-7000 9:30AM - 5:30 PM) Second source student version of Matlab: HiEd: http://www.hied.com/uttyler/ (approximate cost $99).