EENG331 : Electromagnetics II

Department:
Electrical and Electronic Engineering

Program Name: Electrical and Electronic Engineering	**Program Code:** 27

Course Number: EENG 331	**Credits:** 3

☒ Required Course ☐ Elective Course

Prerequisite(s):
EENG232

Catalog Description:
Electromagnetic induction; Faraday's and Lenz's laws; transformer and motional electromotive force; induction heating; transformer; displacement current; time-varying fields; Maxwell's equations; wave equations; time-harmonic fields; complex phasors; scalar and vector potential functions; plane waves in vacuum; plane waves in dielectrics and conductors; polarization; skin effect; electromagnetic energy and power; Poynting's theorem; reflection and refraction of plane waves at dielectric interfaces; Snell's laws; Fresnel formulas; critical angle; total internal reflection; total transmission; Brewster's angle; standing waves; transmission line theory; TEM waves; transmission line parameters; lossy and lossless lines; matching of transmission lines to their loads.

Course Web Page:
http://opencourses.emu.edu.tr/course/view.php?id=8&notifyeditingon=1

Textbook(s):
1) Elements of Electromagnetics, Matthew N.O.Sadiku, Oxford University Press, 2007

Indicative Basic Reading List :
1. Fundamentals of Engineering Electromagnetics, David K. Cheng, Addison Wesley, 1993
2. Engineering Electromagnetics, William H. Hayt, McGraw-Hill
3. Electromagnetics, John D. Kraus and Keith R. Carver, McGraw-Hill

Course Outline:

Week 1: Familiarization with the Course and the teaching and learning environment

Week 2 -5: **Time- Varying Fields and Maxwell's Equations:**
Electromagnetic induction; Faraday's and Len's laws; Transformer and motional electromotive force displacement current; Time-varying fields; Maxwell's equations; Wave equations; Time-harmonic fields; Complex phasors; Scalar and vector potential functions.

Week 6-8: **The Uniform Plane Wave:**
Complex phasors; Scalar and vector potential functions. Plane waves in vacuum; Plane waves in dielectrics and conductors; polarization; Skin effect; Electromagnetic energy and power; Poynting's vector; Poynting's theorem.

Week 9-10: **Mid-Term Examination**

Week 11-13: **Reflection and Refraction of Plane Waves at Dielectric Interface:**
Snell's laws; Fresnel formulas; Critical angle; Total internal reflection; Total transmission; Brewster's angle; standing waves.

Week 13-14: **Transmission Lines:**
ine equations; TEM waves; Transmission line parameters; -Lossy and lossless lines; Matching of nes to their loads.

Week 15: **Final Examinations**

Course Learning Outcomes:

a) On successful completion of this course,
- Students will become more familiar with fundamental theory of electrodynamics.

- Students will learn the basic applications of Maxwell's equations.
- Students will learn basic properties of electromagnetic plane waves.
- Students will learn basic transmission line theory.
- Students will learn basic impedance matching concepts.

b) On successful completion of this course, all students will have developed their appreciation of and respect for values and attitudes regarding, carrying out directed private study using textbooks and other provided resources.

Class Schedule:	**Tutorial Schedule:**
4 hrs of lectures per week	1 hr of tutorial per week

	Method	**No**	**Percentage**
Assessment	Midterm Exam(s)	1	35%
	Quiz(s)+Homeworks	3+3	20 %
	Final Examination	1	45%

Contribution of Course to Criterion 5

Credit Hours for:

Mathematics & Basic Science : 0
Engineering Design : 4
General Education : 0

Relationship of Course to Student Outcomes

The course has been designed to contribute to the following student outcomes:

(a) An ability to apply knowledge of mathematics, science, and engineering.
(e) An ability to identify, formulate and solve engineering problems.

Contribution of Course Learning Outcomes to Student Outcomes

	Student Outcome:										
Course Learning Outcome	**a**	**b**	**c**	**d**	**e**	**f**	**g**	**h**	**i**	**j**	**k**
1) Students will become more familiar with fundamental theory of electrodynamics.					•						
2) Students will learn the basic applications of Maxwell's equations.	•				•						
3) Students will learn basic properties of electromagnetic plane waves.	•				•						
4) Students will learn basic transmission line theory.	•				•						
5) Students will learn basic impedance matching concepts.	•				•						

Prepared by: Rasime Uyguroğlu	**Date Prepared:** 24 September 2019