EENG 463 ANTENNA THEORY

Department:
Electrical and Electronic Engineering

Program Name: Electrical and Electronic Engineering	**Program Code:** 27
Course Number: EENG 463	**Credits:** 4

☐ Required Course ☒ Area Elective

Prerequisite(s):
EENG 331

Catalog Description:
Brief review of electromagnetic theory. Antenna parameters. Radar equation. Friis transmission formula. Receiving antennas; effective area, polarization mismatch factor. Radiation; retarded potentials. Hertzian dipole. Near and far fields. Linear antennas. Uniform and non-uniform arrays. Pattern multiplication. Dipoles above ground. Aperture antenna theory. Horn and reflector antennas. Propagation. Basic modes of propagation. Ground and surface waves. Ionospheric wave propagation.

Course Web Page: http://opencourses.emu.edu.tr/course/view.php?id=395

Textbook(s):
C.A. Balanis, Antenna Theory: Analysis and Design, 2/e, John Wiley & Sons, Inc., 1996

Indicative Basic Reading List :
1. Kraus, Antennas, McGraw-Hill
2. Stutzman and Thiele, Antenna Theory and Design, Wiley.

Course Outline:

Week 1:	**Course Registration Period** Course objectives, course description,
Week 2 -3:	Radiation pattern, Directive gain, Directivity, Gain, Efficiency, Beamwidth, Polarization, Input impedance.
Week 4:	Effective aperture, Friis transmission equation, Radar range equation.
Week 5-6:	Hertzian Dipole, Small and finite size dipoles, Loop antennas.
Week 7-8:	2 element array, N-element array, Maxima, Minima, Sidelobes, Pattern multiplication, Non-uniform aperture distribution.
Week 9-10:	**Midterm Examinations**
Week 11	Dipoles above ground.
Week 12-13	Rectangular and circular apertures, Horn antennas, Reflector and lens antennas
Week 14	Groundwave, tropospheric and ionospheric propagation
Week 15:	**Final Examination**

Course Learning Outcomes:
1. On successful completion of this course, all students will have developed **knowledge** and **understanding** of:
   (a) Basic parameters of antennas,
   (b) Friis transmission formula and radar range equation,
   (c) Hertzian dipoles and finite size dipoles,
   (d) Linear array antennas,
   (e) Dipoles above ground,
   (f) Aperture antennas,
   (g) Basic modes of propagation
2. On successful completion of this course, all students will have developed their appreciation of respect for **values and attitudes** regarding, carrying out directed private study using textbooks other provided resources.

Class Schedule: 4 hrs of lectures per week	**Tutorial Schedule:** 2 hours of laboratory work per week

	Method	**No**	**Percentage**
Assessment	Midterm Exam	1	35%
	Quizzes+ Homeworks	3+4	15 %
	Laboratory Work	3-4	10%
	Final Examination	1	40%

Make-Up Policy:
Students missing an examination should provide a valid excuse within three days following the examination they missed. No separate make-up exams are administered for midterm and final exams. Re-sit examination is to be

used as make-up examinations, instead.

Contribution of Course to Criterion 5

Credit Hours for:
Mathematics & Basic Science : 0
Engineering Design : 4
General Education : 0

Relationship of Course to Program Outcomes

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

(a) ability to apply knowledge of mathematics, science, and engineering;
(b) ability to design and conduct experiments, as well as to analyze and interpret data;
(c) ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability;
(e) ability to identify, formulate, and solve engineering problems
(i) ability to engage in and recognize the need for life-long learning;
(k) ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Contribution of Course Learning Outcomes to Student Outcomes

Course Learning Outcome	**Student Outcomes**										
	a	b	**c**	d	**e**	f	g	h	i	j	**k**
1) Basic parameters of antennas,	•		•		•				•		•
2) Friis transmission formula and radar range equation,	•		•								•
3) Hertzian dipoles and finite size dipoles,	•	•	•		•						•
4) Linear array antennas,	•		•		•						•
5) Dipoles above ground,	•		•		•						•
6) Aperture antennas,	•		•		•						•
7) Basic modes of propagation	•		•		•						•

Prepared by: Rasime Uyguroğlu | **Date Prepared:** 17 February 2020