COURSE TRAINING PROGRAM FORM

Course Name	Code	Regular Semester	ECTS Credits	Credits	Lecture	2
					Application	0
Antennas Propagation and Laboratory	*0144600*	*7*	*6*	*3*	Laboratory (Hour/Week)	2

Compulsory or Elective	*Elective*
Instructor	*Asst.Prof.Dr.Refet RAMİZ*
Course Contents	History and technical development of the antennas, Delayed electric-magnetic scaler, Find out the fields by using the vector potential functions, Important theorems and concepts in electromagnetic theory (energy theorems duality, stability) / Modelling principles in electromagnetic theory, Electric and Magnetic Field Integral Equations (EFIE, MFIE) / Method of Moment (MOM) / Far field and near field calculation of the time harmonic electric and magnetic dipoles, Hertz dipole, Antenna Parameters (radiation field, radiation resistance, radiation diagram, Radiation effectiveness, gain, Radiation power, Half power beam width (HPBW), Effective radiated power, Effective surface, Effective length, Communication equations (Friis equations), Thin antennas, Half wave dipol antennas, Structures for changing the current distribution along the antennas, Antenna arrays, Frequency dependent antennas (Helix, log-periodic antennas), Recognizing antenna modelling set / Investigation of the log-periodic antennas, monopol and dipol antennas, and antenna arrays (laboratory application), Aperture antennas / Microstrip Antennas, Patch microstrip Antennas applications (laboratory application), Parabolic reflector antennas consisting of antennas with different fed / Optoelectronic antennas / Lens antennas / SAR Antennas, Yagi-Uda antenna, Horn antenna applications (laboratory application), Parameters that effects the electromagnetic wave propagations, Earth-Earth communication (from ELF to SHF), GSM base station antenna applications, Array antenna applications (laboratory application), Earth-Ionosphere-Earth Communication, Choosing principles for communication paths, Radio link antenna applications, (laboratory application)
Course Objectives	To teach the operation principles of the antenna by considering the electromagnetic fields and waves, To define the basic antenna parameters To teach antenna types To investigate the propagation effects To investigate the electromagnetic waves behaviour within the different propagation media
Course Outcomes (The knowledge and the skills that the student will gain at the end of the course)	Students will be able to define an engineering problem and offer different solutions for it
Textbook	Available, Antennas and Propagation textbook
Additional References	1. J.D.Kraus, "Antennas for All Applications", McGrawHill, 2002 2. C.A.Balanis, "Advanced Engineering Electromagnetics", JohnWiley & Sons, 1989 *3.* D.J.Griffiths, "Elektromagnetik Teori", Arte Güven, 1996.

Prerequisite Courses	
Prerequisite Subjects	It will be helpful to have preinfo about the following subjects for better understanding; Electromagnetic Field Theory, Electromagnetic Wave Theory, Engineering Mathematics
Homework/Project	There are 5 home-works that will be given during the semester
Laboratory	There are 5 laboratory applications that will be realised during the semester
Computer Applications	*Yes*
Additional Practices	

Course Evaluation Criteria

	Number	Effective Proportion %
Midterm Exams	*2*	*30*
Quiz	*None*	
Homework	*5*	*10*
Term Projects	*None*	
Term Papers	*None*	
Laboratory	*5*	*20*
Other		
Final Exam	*1*	*40*

WEEKLY COURSE PLAN

Week	Subject
1	History and technical development of the antennas, Delayed electric-magnetic scaler, Find out the fields by using the vector potential functions
2	Important theorems and concepts in electromagnetic theory (energy theorems duality, stability) / Modelling principles in electromagnetic theory
3	Electric and Magnetic Field Integral Equations (EFIE, MFIE) / Method of Moment (MOM) / Far field and near field calculation of the time harmonic electric and magnetic dipoles
4	Hertz dipole, Antenna Parameters (radiation field, radiation resistance, radiation diagram, Radiation effectiveness, gain, Radiation power, Half power beam width (HPBW), Effective radiated power, Effective surface, Effective length, Communication equations (Friis equations),
5	Thin antennas, Half-wave dipole antennas, Structures for changing the current distribution along the antennas, Antenna arrays, Frequency dependent antennas (Helix, log-periodic antennas),
6	1st Exam
7	Recognizing antenna modelling set / Investigation of the log-periodic antennas, monopol and dipol antennas, and antenna arrays (laboratory application),
8	Aperture antennas / Microstrip Antennas
9	Patch microstrip Antennas applications (laboratory application),
10	Parabolic reflector antennas consisting of antennas with different fed / Optoelectronic antennas / Lens antennas / SAR Antennas
11	Yagi-Uda antenna, Horn antenna applications (laboratory application)
12	2nd Exam
13	Parameters that effects the electromagnetic wave propagations, Earth-Earth communication (from ELF to SHF)
14	GSM base station antenna applications, Array antenna applications (laboratory application),
15	Earth-Ionosphere-Earth Communication, Choosing principles for communication paths, Radio link antenna applications, (laboratory application)

Course Outcomes

	The objective knowledge and abilities earned by the student with the Electronics and Communications Engineering Department Program	**1**	**2**	**3**
1	Ability to apply knowledge of natural science and engineering			**X**
2	Ability to design and conduct experiments, as well as to analyze and interpret data		**X**	
3	Ability to design a system			**X**
4	Ability to function as a team member		**X**	
5	Ability to identify, formulate, and solve engineering problems			**X**
6	Understanding of professional and ethical responsibility		**X**	
7	Ability to communicate effectively	**X**		
8	Knowledge of the impact of the profession in a global and social context			**X**
9	Recognition of the need for life-long learning		**X**	
10	Knowledge of contemporary issues		**X**	
11	Ability to use modern engineering tools and the techniques		**X**	
12	Providing the opportunity to the student gain more detailed knowledge of chosen research subject in electronics and communications engineering and to apply it.			**X**

Contribution of the course: **1:** None, **2:** Partial, **3:** Full.