AYDIN ADNAN MENDERES UNIVERSITY
COURSE INFORMATION FORM

Course Title	Electromagnetic Theory I								
Course Code	FİZ403		Couse Level	First Cycle (Bachelor's Degree)					
ECTS Credit	7	Workload	175 *(Hours)*	Theory	4	Practice	0	Laboratory	0
Objectives of the Course	Electrostatic and special technique of potential and the behavior of dielectric material when it is placed in an electric field will be investigated.								
Course Content	Vector analysis and coordinate systems. Electrostatics: electric field, Gauss law, electric potential, work and energy, conductors. Potential calculation techniques: Laplace equation, separation of variables method, multipole expansion. Dielectrics: polarization and electric field of polarized object. Displacement vector, linear dielectrics.								
Work Placement	N/A								
Planned Learning Activities and Teaching Methods	Explanation (Presentation), Discussion								
Name of Lecturer(s)	Prof. Hasan Hüseyin KART								

Assessment Methods and Criteria		
Method	Quantity	Percentage (%)
Midterm Examination	1	30
Final Examination	1	70
Assignment	4	10

Recommended or Required Reading	
1	Introduction to Electrodynamics, D.J.Griffiths, 2003
2	Electricity and Magnetism, Edward M. Purcell, 2011
3	Classical Electrodynamics, John David Jackson, 1998
4	The Feynman Lectures on Physics, Vol. II, Richard P. Feynman, Robert B. Leighton, 2011

Week	Weekly Detailed Course Contents	
1	Theoretical	Vector algebra, differential calculus
2	Theoretical	The fundamental theorem for gradients, divergences , curls, curvilinear coordinates, Dirac Delta functions
3	Theoretical	Electric field , Coulomb’s law and continuous charge distributions
4	Theoretical	Divergence and Curl of electrostatic field and applications of Gauss’s law
5	Theoretical	Electric potential
6	Theoretical	Work and energy, conductors
7	Intermediate Exam	Midterm
8	Theoretical	Special techniques, the properties of Laplace’s equations
9	Theoretical	The method of images charge, induced surface charge, other image problems
10	Theoretical	Separation of variables, cartesian and spherical coordinates
11	Theoretical	Dielectrics media, polarization, dielectrics, induced dipoles, polar molecules
12	Theoretical	The electric field of a Polarized object, bound charges, the electric field inside a dielectric
13	Theoretical	Electric displacement vector, Gauss’s law in the presence of dielectrics
14	Theoretical	Linear dielectrics, susceptibility, permittivity, dielectric constant
15	Theoretical	Special problems for linear dielectric, energy in dielectric systems, forces on dielectrics

Workload Calculation				
Activity	Quantity	Preparation	Duration	Total Workload
Lecture - Theory	14	6	3	126
Midterm Examination	1	20	2	22

Final Examination	1	25	2	27
			Total Workload (Hours)	175
			[Total Workload (Hours) / 25*] = **ECTS**	7
**25 hour workload is accepted as 1 ECTS*				

Learning Outcomes	
1	Geometrical interpretation of Divergence, Curl, Gradient and these equations apply to fundamental problems of electrostatic and sampling them to real world
2	How to calculate the electric field due to point charge and to apply Gauss's law
3	The electric field of continuous charge distributions can be calculated
4	The concepts of electric field and electrical potential should be explained
5	The potential which is created by localized charge distribution should be calculated
6	The fundamental properties of conductors should be learned such as behavior of a conductor in an electrical field
7	Laplace equation should be solved under different boundary conditions
8	The fundamental principles of electromagnetism should be known and applied to the problems
9	The potential at which ground surface by creating point charge should be calculated
10	The fundamental properties of dielectric concepts and also dielectric under the electric field should be learnt
11	The fundamental concepts, such as, Polarisability and permittivity should be learnt.

Programme Outcomes *(Physics)*	
1	To understand the importance of physics by understanding the general concepts of physics, matter and energy
2	To be able to define the movements of matter and to distinguish the characteristics of movements under different force (potential)
3	Be able to say the meaning of Lagrange and Hamiltonian formulations of the movement and apply them to simple problems,
4	To be able to express the fundamental concepts such as time, space, force, momentum and energy in the movements of matter close to the speed of light and be able to solve and interpret the simple problems related to
5	To be able to establish the relationship between electric and magnetic forces and to be able to illustrate their applications to technology and solve problems related to the movement of particles in electric and magnetic fields
6	Be able to say the basic laws of electromagnetics and apply them to problems, illustrate their applications to simple technology
7	To be able to tell the reasons of the differences between the classical cases and the quantum scale and explain the reasons
8	Explain the concepts of discontinuity, uncertainty, matter-antimatter, indecisiveness of quantum physics with examples and explain simple problems related to the subject.
9	To be able to solve the problems of micro-particles under different simple potentials and be able to say their meanings
10	To be able to establish the relationship between the movements and properties of multi-particle systems and the laws of probability and solve simple problems
11	To be able to illustrate the laws, meanings and applications of thermodynamics and use them
12	Be able to use their knowledge about quantum physics and mechanics in explaining some properties of atoms and nuclei
13	To be able to show the meanings of some theoretical concepts by experimenting, and develop a strong relationship between thought and the real world, develop analytical thinking
14	To be able to apply the meanings of the basic laws of physics, their comprehension of universality and the relations between them and the unity of the laws of nature.
15	Use computer to solve physics problems
16	To be able to understand the problems by using their analytical knowledge skills and to propose solutions by dealing with the laws of physics
17	Be able to use the knowledge of physics to understand new technologies
18	To be able to tell the relations between symmetry and conservation laws in laws of physics

Contribution of Learning Outcomes to Programme Outcomes *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11
P1	2	3	2			2	2			3	3
P2	2	3	2			2	2			3	3
P5	3	5	3	5	3	3	3	3	3	3	3
P6	5	5	5	5	5	5	5	5	5	5	5
P7	3	3	3	3	3	3	3	3			
P8								2	2	2	2
P9	2	3	2	2	5	3	3	3	3	3	3
P10	2	2	2	2	2						

P11										2	2
P12	2	2	2	2							
P13		5	5	5	2	2					
P14	5	5	3	3	3	3	3	3	3	3	3
P15	2	2	2	2	2						
P16	5	5	5	5	5	5	5	5	5	5	5
P17	2	2	2	2							
P18	2	2	2	2							