TOROS ÜNİVERSİTESİ

Faculty Of Engıneerıng
Computer And Software Engıneerıng

Course Information

PHYSICS II					
Code	**Semester**	**Theoretical**	**Practice**	**National Credit**	**ECTS Credit**
		Hour / Week			
PHY102	Spring	3	2	4	

Prerequisites and co-requisites	None
Language of instruction	English
Type	Required
Level of Course	Bachelor's
Lecturer	Asst. Prof. Çağdaş ALLAHVERDİ
Mode of Delivery	Face to Face
Suggested Subject	None
Professional practise (internship)	None
Objectives of the Course	The course introduces students to the laws of electricity and magnetism, electric circuits, the properties of electromagnetic waves.
Contents of the Course	The topics covered in this course include: • electric charge, electric fields, Gauss's law, electric potential; • electric properties of materials, conductors and dielectrics; • electric current, resistance, Ohm's law; • simple DC electric circuits, Kirchhoff's circuit laws; • AC circuits, phasors, phasor diagrams for AC circuits; • magnetic fields and force, Biot-Savart law, Amper's law; • magnetic induction, Faraday's law; • Maxwell's equations, electromagnetic waves;

Learning Outcomes of Course

#	Learning Outcomes
1	To be able to understand Coulomb's Law and use it for solving physics problems
2	To be able to understand Kirchhoff's current laws and use it for solving physics problems.
3	To be able to understand Maxwell's equations.
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.
6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.

Course Syllabus

#	Subjects	Teaching Methods and Technics
1	Introduction to electricity and magnetism. Electrical charge and its properties.	Lecture
2	Electric fields. Electric fields of simple charge configurations. Concept of the flux of a vector field.	Lecture
3	Flux of electric field, Gauss' law. Fields of simple charge configurations using Gauss' law. Electric potential and work of electric field. Relation between electric potential and energy, example of electric circuits.	Lecture
4	Examples of calculating electric potential for simple configurations of charges. Electrostatic properties of conductors. Electrostatic properties of dielectrics, polarization and electric dipoles.	Lecture
5	Electrostatic potential in conductors and capacitance. Capacitance of a capacitor. Introduction to electric current: flow of	Lecture

	electric charge in conductors.	
6	Basics of electric circuits, electromotive force, change of electric potential in a circuit, motion of current in a circuit. Kirchhoff’s rules. Examples: series and parallel connections of resistors, ideal and real batteries, example of a multi-loop circuit.	Lecture
7	Magnetic field and magnetic force. Biot-Savart Law. Example magnetic field of a long straight wire. Ampere’s law. Example magnetic field of a long straight wire, magnetic field of a solenoid. Homestudy/handout: Vector product of vectors; magnetic field/force using vector product.	Lecture
8	Midterm Exam	Exam
9	Magnetic properties of matter, magnetic dipoles, diamagnetic, paramagnetic, ferromagnetic materials. Amplification of magnetic field in ferromagnetics, hysteresis.	Lecture
10	Magnetic inductance, Faraday’s law. Example solving problems using Faraday’s law. Self and mutual inductance for a solenoid. Homestudy/handout: Transient phenomena in RC and RL circuits; energy of electric and magnetic fields.	Lecture
11	Maxwell-Ampere’s equation, displacement current, and Maxwell’s equations. Electromagnetic waves as a solution of Maxwell equations. Main properties of electromagnetic waves: spectrum, polarization states, speed in materials. Overview of Fresnel formulas for reflection and refraction.	Lecture
12	Maxwell equations and special relativity, Lorentz transformation, basic effects of special relativity. Basics of wave optics; superposition and interference of EM waves. Diffraction of EM waves. Example diffraction on two slits. Example interference from thin film.	Lecture
13	Alternating current. Properties of AC, phasor representation of AC waves. Resistance, capacitance and inductance in AC circuits.	Lecture
14	Kirchhoff’s voltage rule for AC circuits, phasor diagrams. RLC circuit, impedance, phase shift, power factor.	Lecture
15		
16	Final Exam	Exam

Course Syllabus

#	Material / Resources	Information About Resources	Reference / Recommended Resources
1	H.D. Young, R.A. Freedman and A.L. Ford, Sears and Zemansk's University Physics with Modern Physics Technology Update, 13th Edition, ISBN 10: 0-321-89470-7, 2014		
2	D. Halliday, R. Resnick, J. Walker, Fundamentals of Physics Extended, 9th Edition, Wiley, 2009 ISBN-10: 0-321-64363-1, 2010.		
3	Raymond A. Serway, Physics for Scientists and Engineers, 4th edition, Saunders College Pub, 1996		

Method of Assessment

#	Weight	Work Type	Work Title
1	40%	Mid-Term Exam	Mid-Term Exam
2	40%	Final Exam	Final Exam
3	20%	Laboratory	Laboratory

Relationship between Learning Outcomes of Course and Program Outcomes

#	Learning Outcomes	Program Outcomes	Method of Assessment
1	To be able to understand Coulomb's Law and use it for solving physics problems	1	1,2
2	To be able to understand Kirchhoff's current laws and use it for solving physics problems.	1	1,2
3	To be able to understand Maxwell's equations.	1	1,2
4	Ability to devise, select, and use modern techniques and tools needed for engineering practice; ability to employ information technologies effectively.	1	1,2,3
5	Ability to design and conduct experiments, gather data, analyze and interpret results for investigating engineering problems.	1	1,2,3

6	Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually.	1	1,2,3

PS. The numbers, which are shown in the column Method of Assessment, presents the methods shown in the previous table, titled as Method of Assessment.

Work Load Details

#	Type of Work	Quantity	Time (Hour)	Work Load
1	Course Duration	14	5	70
2	Course Duration Except Class (Preliminary Study, Enhancement)	14	4	56
3	Presentation and Seminar Preparation	0	0	0
4	Web Research, Library and Archival Work	0	0	0
5	Document/Information Listing	0	0	0
6	Workshop	0	0	0
7	Preparation for Midterm Exam	0	0	0
8	Midterm Exam	1	20	20
9	Quiz	0	0	0
10	Homework	7	3	21
11	Midterm Project	0	0	0
12	Midterm Exercise	0	0	0
13	Final Project	0	0	0
14	Final Exercise	0	0	0
15	Preparation for Final Exam	0	0	0
16	Final Exam	1	30	30
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