ISHIK UNIVERSITY
FACULTY OF EDUCATION
Department of PHYSICS EDUCATION,
2018-2019 Spring
Course Information for PHYS 226 ELECTRICTY AND MAGNETISM II

Course Name:	ELECTRICTY AND MAGNETISM II

Code	Course type	Regular Semester	Theoretical	Practical	Credits	ECTS
PHYS 226	2	4	3	2	4	5

Name of Lecturer(s)-Academic Title:	i i -
Teaching Assistant:	.
Course Language:	English
Course Type:	Main
Office Hours	Thursday, 1:30-3:30
Contact Email:	Te
Teacher's academic profile:	Asst. Lecturer
Course Objectives:	Define electric current (I). Understand in which direction charge moves and current flows. Calculate electric current, current density, drift velocity. Know what happens when a current comes to a junction in a circuit. Define resistance (R) and know how it can be altered. Use Ohm's law to design circuits. Calculate resistance from resistivity (conductivity). Calculate power in electric circuits (both electrical energy transfer and energy lost through resistance). Describe several ways that power losses can be minimized in electricity transmission. Understand how superconductivity is related to resistivity & explain possible applications including like power transmission, magnetic levitation, MRI, etc. Define electromotive force (EMF). Understand how batteries work. Calculate R equivalent for resistors in series and in parallel. Analyze multi-loop circuits using the junction rule and the loop rule (Kirchhoff\'s rules). Understand how to use an ammeter, voltmeter, ohmmeter, and potentiometer in a circuit. Analyze circuits that include both a resistor and capacitor (RC circuits). Calculate current and capacitor charge for a charging/discharging RC circuit. Understand the role of the capacitive time constant (τ) in a charging/discharging RC circuit. Draw the graphs of current and capacitor charge as a function of time for a charging/discharging RC circuit. Explain phenomena such as an electric eel does not cook itself while killing prey, electric signals in the body, the correct way to wire a house, etc. Define magnetic field (B). Know what situations can create a magnetic field. Draw magnetic field lines around: bar magnet, horseshoe magnet, Earth, etc. Calculate the force felt by a charged particle moving in a magnetic field Know in which situations the charged particle's motion is circular, helical or in a straight line. Calculate the force on a current-carrying wire in a magnetic field. Explain applications of this chapter's theory including: discovery of the electron's charge, mass spectrometers, EKG machines, electric motors, cathode ray tubes, etc. Draw magnetic field lines around a wire and through a solenoid. Use the Biot-Savart law to calculate the magnetic field at a point due to: infinite straight wire, circle of wire, finite straight wire, etc. In cases with special symmetry, use Ampère's Law instead to calculate the magnetic field: inside and outside a cylindrical wire, infinite straight wire, solenoid, etc. Calculate the magnetic dipole moment of a loop or of a solenoid. Understand how a wire loop or solenoid feels a torque when placed in a magnetic field. Understand applications: how speakers work, electric motor, etc. Know that changing the magnetic flux through a wire or solenoid induces a current & EMF in the wire. Use Faraday's law of induction to calculate the induced EMF. Use Lenz's law to predict which way the current/EMF will be. Understand eddy currents and losses due to heat. Know what an inductor is. Define inductance (L) and know what it depends on. Explain how the following work: traffic light sensor, vibrating sample magnetometer, etc.
Course Description (Course overview):	This course is designed to help students get familiar with electric current, current density, " pumping V charge, work, energy, and emf, calculating the current in a single-loop circuit, what produces a magnetic field?, discovery of the electron, magnetic force on a current-carrying wire, the magnetic dipole moment, calculating the magnetic field due to a current, Biot-Savart Law, ampere's law, faradays law of induction, lenz's law.

COURSE CONTENT

Week	Hour	Date	Topic

1	3	3-7/2/2019	Introduction
2	3	10-14/2/2019	Current and Current Density
3	3	17-21/2/2019	Resistance, Ohm’s Law
4	3	24-28/2/2019	Electric Energy and Power
5	3	3-7/3/2019	EMF, Resistors in Series and Parallel, Single Loop
6	3	26-28/3/2019	Multiple Loop
7	3	31/3-4/4/2019	RC Circuit
8	3	7-11/4/2019	RC Circuit
9	3	14-18/4/2019	Midterm Exam
10	3	21-25/4/2019	Magnetic Field and Force
11	3	28/4-2/5/2019	Charged Particle in a Magnetic Field
12	3	5-9/5/2019	Torque on a Current Loop
13	3	12-16/5/2019	Biot-Savart Law
14	3	19-23/5/2019	Ampere’s Law and Its Applications
15	3	26-30/5/2019	A Current-Carrying Coil as a Magnetic Dipole, Faraday’s Law, Lenz’s Law
16	3	9-13/6/2019	Final Exam
17	3	16-20/6/2019	Final Exam

COURSE/STUDENT LEARNING OUTCOMES

1	Learning about current, resistance, and emf. Analysis of simple electric circuits using Kirchhoff’s laws.
2	Calculating the Current in a Single-Loop Circuit, Multiloop Circuits.
3	Learning about origins of the magnetic field and its calculations.
4	Learning about and solving problems related to Faraday’s and Lenz laws and their applications.
5	Operate basic Laboratory equipment, collect, analyze, and plot data, write results and draw conclusions in a submitted report.

COURSE'S CONTRIBUTION TO PROGRAM OUTCOMES

(Blank : no contribution, I: Introduction, P: Profecient, A: Advanced)

	Program Learning Outcomes	**Cont.**
1	Demonstrate the ability to perform theoretical calculations in basic areas of physics (Mechanics, Electricity & Magnetism, and Modern Physics).	P
2	Demonstrate quantitative and qualitative analysis of physical problems.	P
3	Proficient with equipment and procedures used to acquire and analyze data of physical phenomena through performance in laboratory activities.	P
4	Perform analysis and calculations based on experimental data, draw and present valid conclusions, and process and visualize their data.	P
5	Report in written format the results of their calculations, research projects, and reading of technical literature.	P
6	Create and effectively present on oral report on the results of their calculations, research projects, and reading of technical literature.	P
7	Know about their career options, what skills and experiences are required for those careers, and are able to develop a resume that advances them towards their career goals.	P

Prerequisites (Course Reading List and References):	PHYS 122 Introduction to Physics II
Student's obligation (Special Requirements):	Attending 80% of the course is mandatory. Participation in class activities is encouraged. Students are responsible for materials given in class. Students are responsible for assignments. Students must bring their own calculators.

Weekly Laboratory/Practice Plan:	**Week**	**Hour**	**Date**	**Topics**
	1	2	3-7/2/2019	Introduction
	2	2	10-14/2/2019	Charging and discharging a capacitor when switching DC on and off (with CRO)-1
	3	2	17-21/2/2019	Charging and discharging a capacitor when switching DC on and off (with CRO)-2
	4	2	24-28/2/2019	Measuring the current in a coil when switching DC on and off (L)-1
	5	2	3-7/3/2019	Measuring the current in a coil when switching DC on and off (L)-2
	6	2	26-28/3/2019	Magnetic force due to a current-carrying wire using current balance
	7	2	31/3-4/4/2019	Determining the inductive reactance of a coil in an AC circuit (XL)
	8	2	7-11/4/2019	Determining the capacitive reactance of a capacitor in an AC circuit (XC)
	9	2	14-18/4/2019	Determining capacitive reactance with a Wien measuring bridge
	10	2	21-25/4/2019	Determining inductive reactance with a Maxwell measuring bridge
	11	2	28/4-2/5/2019	
	12	2	5-9/5/2019	
	13	2	12-16/5/2019	
	14	2	19-23/5/2019	
	15	2	26-30/5/2019	
	16	2	9-13/6/2019	
	17	2	16-20/6/2019	

Course Book/Textbook:	"Fundamentals of Physics", by Halliday, Resnick and Walker, Ninth Edition, John Wiley & Sons, Inc (2011).
Other Course Materials/References:	"College Pysics" Serway9th edition "Physics"9th-Edition John D. Cutnell & Kenneth W. Johnson
Teaching Methods (Forms of Teaching):	Lectures, Practical Sessions, Excersises, Presentation, Assignments, Demonstration

COURSE EVALUATION CRITERIA

Method	Quantity	Percentage (%)
Participation	1	5
Quiz	2	2.5
Homework	5	1
Midterm Exam(s)	1	20
Laboratory	10	1
Final Exam	1	40
Total		**85**

Examinations: Essay Questions, True-False, Fill in the Blanks, Multiple Choices, Short Answers, Matching

Extra Notes:

ECTS (ALLOCATED BASED ON STUDENT) WORKLOAD			
Activities	**Quantity**	**Duration (Hour)**	**Total Work Load**
Course Duration (Including the exam week: 16x Total course hours)			0
Hours for off-the-classroom study (Pre-study, practice)			0
Assignments Mid-terms			0
Final examination			0
Other			0
Total Workload			**0**
ECTS Credit (Total workload/25)			**0**

Peer review

Signature:	Signature:	Signature:
Name:	Name:	Name:
Lecturer	Head of Department	Dean