University of Management and Technology

School of Science (SSC)

Department of Physics

Course Code: PH-102
Course Title: ELECTRICITY AND MAGNETISM
Program: BS (PH/CH/MA)

Course Outline (Spring Semester 2023)

Schedule	Monday: 09:30 am-10:45 am Wednesday: 09:30 am-10:45 am	**Pre-requisite**	PH-101
Course Coordinator	Dr. Zaheer Hussain Shah	**Contact**	zaheer.hussain@umt.edu.pk
Course Description	Coulomb's law, electric field due to a single charge and distribution of charges, electric flux and Gauss's law, electric potential due to a single charge and distribution of charges, capacitance and dielectrics, current and resistances, direct current circuits, Kirchhoff's rules, RC circuits, magnetic field and forces, Biot-Savart law, Ampere's law, Faraday's law of induction, inductance, alternating current circuits, RL circuits, LC circuits and RLC circuits, Maxwell's equations. The learning in this course is strengthened by related lab work.		
Expected Outcomes	Participants will learn calculus based general physics approach. They will also be ready for Electronics, Electromagnetics and Instrumentation and Measurements courses.		
Text Book	Physics for Scientist and Engineers, John W. Jewett, Jr., Raymond A. Serway, 6th and 7thEdition, Thomson Brooks/Cole, US, 2008. Second Indian Reprint 2011		
Reference Book	Fundamentals of Physics, 8th Edition by Halliday, Resnick, and Walker.		
Assignments	Problems will be assigned at regular intervals as an assignment.	**Quizzes**	All quizzes will be announced well before time. No make-ups will be offered for missed quizzes.
Mid Term Examination	A 60-minutes exam will cover all the material covered during the first 14-16 lectures. Combined Mid Term exam for all multiple sections.	**Final Examination**	A 120-minutes exam will cover all the material covered during the semester. Combined Final exam for all multiple sections.
Attendance Policy	Students missing more than 20% of the lectures will receive an "SA" grade in the course and will not be allowed to take final exam.		
Grading Policy	Assignment + Quizzes: 30% Mid Term Examination: 30% Final Examination: 40%		

Department of Physics
Electricity and Magnetism
(PH-102)

Lecture Plan (Spring 2023)

Week	Lecture #	TOPICS	CH	SECTIONS
1	1 2	Electric charge and Coulomb's Law Electric field of point charge and continuous charge	23 23	1 – 3 4 – 5
2	1 2	Motion of a charged particle in uniform electric field Electric flux and Gauss' Law	23 24	6 – 7 1 – 2
3	1 2	Application of Gauss' Law Potential difference and electric potential	24 25	3 - 4 1 – 2
4	1 2	Electric potential energy due to point charges Electric potential of continuous charge distributions	25 25	3 – 4 5 – 6
5	1 2	Capacitance Combination of capacitors	26 26	1 – 2 3 – 4
6	1 2	Capacitors with dielectrics Electric current and resistance	26 27	5 – 7 1 – 3
7	1 2	Dependence of resistance upon temperature and electrical power Electromotive force and combination of resistors	27 28	4 – 6 1 – 2
8	1 2	Calculating the current in a multi-loop circuit RC circuits	28 28	3 4 – 5
9	1 2	The magnetic force and motion of charged particle in uniform magnetic field The magnetic force on a current carrying conductor	29 29	1 – 3 4 – 6
10	1 2	The Biot-Savart Law and Ampere's Law The magnetic field of a solenoid	30 30	1 - 3 4 - 5
11	1 2	Magnetism in Matter Faraday's Law of induction and Motional emf	30 31	6 – 7 1 – 2
12	1 2	Lenz's Law and Induced emf and electric fields Generators, motors and Eddy Currents	31 31	3 – 4 5 – 7
13	1 2	Self Inductance and RL circuits Energy in a magnetic field	32 32	1 – 2 3 – 4
14	1 2	Oscillations in an LC circuits Alternating current sources	32 33	5 – 6 1 – 4
15	1 2	The RLC series circuit Resonance in a series RLC circuit and transformer	33 33	5 – 6 7 – 8