National University of Sciences & Technology (NUST)
School of Electrical Engineering and Computer Science (SEECS)
Department of Electrical Engineering

Applied Physics

Course Code:	PHY-101	**Semester:**	1st
Credit Hours:	3+1	**Prerequisite Codes:**	
Instructor:	**Muhammad Nadeem**	**Class:**	BEE
Office:	051-90852357	**Telephone:**	**********
Lecture Days:	Monday-Wednesday	**E-mail:**	Muhammad.nadeem@seecs.edu.pk
Class Room:	CR-12	**Consulting Hours:**	Monday/Thursday (0900-1200)
Lab Engineer:		**Lab Engineer Email:**	
Knowledge Group:	Applied Physics	**Updates on LMS:**	Before every lecture

Course Description:

The course comprises the topics of Physics, which are directly related to Engineering and Technology. These include Motion, Friction, Moment of inertia, Oscillations, waves and propagation, Electric Charge & Coulomb's Law, Electric Field, Electric Potential, Capacitors & Dielectric, Current & Resistance, AC and DC, Magnetic fields, Ampere's Law and Faraday's law. For understanding of wave theory, Maxwell equations and Traveling waves are also included.

Course Objectives:

The course aims to give students both a theoretical and a practical foundation for engineering courses, like; Engineering Mechanics, Electromagnetic Field Theory, Systems and Signals, Control Systems, Transmission Lines and Antennas& Microwave Devices. The course gives the students a sound knowledge of Physics with its applications to problems of practical nature. After studying this course the students will be able to apply Physics as a strong tool to understand and develop the problems which they come across in Engineering/Technology.

Books:

Text Book:
1. Physics By Halliday, Resnick & Walker (7th Edition)
2. University Physics by Sears &Zemansky (4th Edition)

Reference Books:
1. Physics for Scientists & Engineers by Serway Jewett (6th Edition)

Topics to be Covered:

1. Waves and Oscillations
2. Charge, Coulomb's law and Electric field
3. Gauss' law
4. Electric potential
5. Electric current and Magnetic field
6. Ampere's law
7. Faraday's law
8. Alternating current and electromagnetic waves
9. Nature and propagation of light

Lecture Breakdown:

Week No.	Topics	Sections	Remarks

1	Lecture 1: Introduction to vector and scalar algebra Lecture 2: Force and linear motion Lecture 3: Work and Energy
2	Lecture 4: Motion in 2-D Lecture 5: Forces and Friction Lecture 6: Rotation and moment of inertia Lab 01
3	Lecture 7: Simple harmonic motion Lecture 8: SHM and energy Lecture 9: Damped and forced oscillations Lab 02
4	Lecture 10: Oscillations and wave propagation Lecture 11: Energy and power carried by waves Lecture 12 Reflection, interference and diffraction Lab 03
5	Lecture 13: Charge and Coulomb's law Lecture 14: Electric field and superposition principle Lecture 15: Electric dipoles Lab 04
6	**OHT-1**
7	Lecture 16: Electric flux Lecture 17: Gauss' law and different symmetries Lecture 18: Contd. Lab 05
8	Lecture 19: Electric potential (point charges and dipole) Lecture 20: Electric potential from electric field and vice versa Lecture 21: Conductors and equipotential surfaces Lab 06
9	Lecture 22: Magnetic force on a moving charges Lecture 23: Magnetic force on a current carrying wires Lecture 24: Torque on current loop and magnetic dipoles Lab 07
10	Lecture 25: Ampere's law and magnetic field due to long wires Lecture 26: Contd. Lecture 27: Magnetic field due to solenoid and torroid Lab 08
11	Lecture 28: Faradays Law of induction, Lenz's law Lecture 29: Motional EMF, Generators and Motors Lecture 30: Induced Electric field Lab 09
12	**OHT-2**
13	Lecture 34: Capacitance, Energy Stored in an Electrical Field Lecture 35: Inductance, Energy Stored in magnetic field Lecture 36: Alternating current and LC circuit Lab 10

14	Lecture 37: RLC circuit Lecture 38: Electromagnetic oscillation Lecture 39: Power in a AC circuit, Transformer Lab 11
15	Lecture 40: Generating an EMW Lecture 41: Maxwell's equations (integral forms) Lecture 42: Introduction to vector calculus Lab 12
16	Lecture 43: Maxwell's equations (differential forms) Lecture 44: Traveling Waves, Radiation pressure Lecture 45: Energy Transport and the Poynting Vectors,
17	Lecture 43: Nature of light Speed, Reflection, Refraction Lecture 44: Diffraction & Polarization Lecture 45: Revision
18	Week 18: ESE

Lab Experiments:	
Lab 01:	Introduction to Lab
Lab 02:	Understanding Errors
Lab 03:	Mini-launcher (Exp. 1,2,3)
Lab04:	Mini-launcher (Exp. 4,6)
Lab 05:	PAScar with Mass (Exp. 1,2,3)
Lab 06:	PAScar with Mass (Exp. 4,6)
Lab 07:	Compound Pendulum
Lab 08:	Heat Engine/Gas Laws (Exp.1,2,3)
Lab 09:	Ripple Tank
Lab 10:	Faraday's Law
Lab 11:	DC Electronics
Lab 12:	DC Electronics

Tools / Software Requirement:

Grading Policy:	
Quiz Policy:	The quizzes will be unannounced and normally last for ten minutes. The question framed is to test the concepts involved in last few lectures. Number of quizzes that will be used for evaluation is at the instructor's discretion.
Assignment Policy:	In order to develop comprehensive understanding of the subject, assignments will be given. Late assignments will not be accepted / graded. All assignments will count towards the total (No 'best-of' policy). The students are advised to do the assignment themselves. Copying of assignments is highly discouraged and violations will be dealt with severely by referring any occurrences to the disciplinary committee. The questions in the assignment are meant to be challenging to give students confidence and extensive knowledge about the subject matter and enable them to prepare for the exams.
Lab Conduct:	The labs will be conducted for three hours every week. A lab handout will be given in advance for study and analysis The lab handouts will also be placed on LMS. The students are to submit their results by giving a lab report at the end of lab for evaluation. One lab report per group will be required. However, students will also be evaluated by oral viva during the lab.
Plagiarism:	SEECS maintains a zero tolerance policy towards plagiarism. While collaboration in this course is highly encouraged, you must ensure that you do not claim other people's work/ ideas as your own. Plagiarism occurs when the words, ideas, assertions, theories, figures, images, programming codes of others are presented as your own work. You must cite and acknowledge all sources of information in your assignments. Failing to comply with the SEECS plagiarism policy will lead to strict penalties including zero marks in assignments and referral to the academic coordination office for disciplinary action.