The Aror University Of Art, Architecture, Design & Heritage Sukkur

Department of Artificial Intelligence

Course Title: Applied Physics Fall-2024

Programs & Class: AI-III	**Semester:** 3rd
Credit Hours: 04 (03+01)	**Instructor:** Engr Ghulam Raza
Office location: Faculty Offices, Department of AI and MMG	**Post-requisite Courses: None**
Consulting hours: Monday to Friday	**e-mail: graza.vfaculty@aror.edu.pk**

EVALUATION

1.	Sessional	**30%**
2.	Mid term	**30%**
3.	Final Examination	**40%**

RECOMMENDED BOOKS:

S.No	Book Name	Author/s Name	Publisher Name & Edition
1.	Fundamentals of Physics	David Halliday, Robert Resnick, and Jearl Walker	Ninth Edition, John Wiley & Sons, ISBN: 0471465097.
2.	University Physics	Hugh D Young and Roger A. Freedman	14th Edition

COURSE DESCRIPTION:

Motion along a straight line, Vectors, dot product and cross product. Motion in 2 and 3 dimensions. Force, Friction, Work and Energy, Kinetic and Potential energy, Conservation of energy, Center of mass and rotation, Linear momentum, Torque and angular momentum, Waves, Vibrations and Oscillations, Simple Harmonic Motion, Wave Motion and Sound, Mechanics, Electric Charge, Conductors and Insulators, Coulomb's Law, Quantization and Conservation of Charge, Electric Fields, Introduction to Electric Field, electric field due to a point charge, electric field due to line of charge, electric field due to charged disk, electric field due to an electric dipole, a dipole in electric field, Gauss' Law, Electric Flux, Gauss' Law and its Applications, Electric Potential, Electric

potential and Electric potential energy, Potential due to a point charge, Potential due to group of charges, Potential due to an electric dipole, Potential due to continuous charge distribution, Capacitance, Introduction to capacitance, Capacitors in parallel and series, Energy stored in an electric field, effect of Dielectric on capacitance, Current and Resistance, Introduction to electric current, Effects of Electric Current. Sources of electricity, Current density, Resistance and Resistivity, Ohm's Law, Power in electric circuits, Semiconductors and super conductors, Introduction to electric circuits, Pumping charges, Work, energy and EMF, Single and Multi-loop circuits, RC circuit, capacitive time constant, The ammeter and voltmeter, Introduction to magnetic fields, The Hall effect, Magnetic field on a current carrying wire, torque on current loop, electromagnetic induction, Faradays law, Lenz's law, induction furnace.

COURSE LEARNING OUTCOMES (CLOs):

CLO1: Illustrate the electromagnetism and mechanical phenomenon mathematically

CLO2: Interpret the basic electric circuits used in electrical engineering

CLO3: Apply the knowledge of Resistors, Capacitors and Inductors to design and implement basic circuits using modern tools and techniques.

CLO4: Apply the knowledge of electromagnetism to perform experiments, analyze data and its interpretation.

CLO5: Apply the knowledge of mechanics to perform experiments, analyze data and its interpretation.

Curriculum Mapping

Serial	CLO	Domain	Taxonomy level	Related PLO	CLOs attainment
1	**Illustrate** the electromagnetic and mechanical phenomenon mathematically	Cognitive	C2	1	First mid , second mid, First Quiz, second Quiz
2	**Interpret** the basic electric circuits used in engineering	Cognitive	C3	1	Second mid, third quiz, fourth quiz
3	Practice and Analyse behavior of passive components.	Psychomotor	P3	2	Mid-term Lab exams
4	**Apply** the knowledge of electromagnetism to perform	Psychomotor	P3	2	Lab exams (Final)

	experiments, analyze data and its interpretation.				
5	**Apply** the knowledge of mechanics to perform experiments, analyze data and its interpretation.	Psychomotor	P3	**4**	Lab exams (Final)

IMPORTANT POLICIES

The student is expected to attend all of the scheduled classes if for some reason the student cannot make a class I should be contacted in advance, if possible, to arrange to turn in class work and to get assignments or related work, if any, for following class. The course will include homework problems, midterm exam and a comprehensive final. The student is expected to turn in all work on time.

SESSION / WEEK WISE DETAILS:

Session No.	Week	Topics	Assignments/ Quizzes / Digital Library work	Suggested Readings
1-6	**02**	**Vectors, Force and Motion:** Position and Displacement, Average Velocity and Average Speed, Acceleration, free fall acceleration, scalars and vectors, addition, components of vectors, unit vectors, multiplying vectors, projectile motion, analysis of projectile motion, the horizontal and vertical motion, the equation of path, the horizontal range, effect of the air. Force, some particular forces, applying newton laws, friction, properties of friction, the drag force and terminal speed.	**Quiz**	Text book[2]
7-16	**03**	**Work and energy:** Work and Energy: Kinetic energy, work, Work and kinetic energy, Work and Potential Energy, Determining Potential Energy Values, Conservation of Mechanical Energy, the center of mass, The Rotational Variables, Are Angular Quantities Vectors? Kinetic Energy of Rotation, linear momentum, the linear Momentum of a System of Particles, Conservation of Linear Momentum, and torque revisited, the angular momentum of systems of particle, conservation of angular momentum.	**Quiz**	Text book[2]
17-23	**02**	**Waves:** Simple Harmonic Motion, The Force Law for Simple Harmonic Motion, Simple pendulum and physical pendulum, types of		Text book[2]

		waves, Transverse and Longitudinal Waves, The Wave Equation, The Principle of Superposition for Waves, Interference of Waves.		
24-27	01	**Electric Charge:** Coulomb's law, Conductors and Insulators, conductor with a cavity, charge quantization, charge conservation.		Text book[1]
28-34	02	**Electric field:** introduction to electric field, Field due to a point charge: electric field of Dipole. **Gauss's law**: Electric flux Gauss's law and its application. **Electric Potential:** Electric potential and Electric potential energy, Potential due to a point charge, Potential due to group of charges, Potential due to an electric dipole, Potential due to continuous charge Solve numerical problems involving topics covered	**Quiz**	Text book [1]
35-44	03	**Capacitance:** Introduction to capacitance Capacitors in parallel and series, Energy stored in an electric field, Dielectric. **Current and Resistance:** Introduction to electric current, Effects of Electric Current, Sources of Electricity, Current density, Resistance and Resistivity, Ohm's Law, Power in electric circuits, Semiconductors and super conductors. **Circuits:** Introduction to electric circuits, Pumping charges, Work, energy and EMF, Single and Multi-loop circuits, The ammeter and voltmeter capacitance, dielectrics. Growth and Decay of voltage in an RC circuit. Solve numerical problems involving topics covered.		Text book [1]
45-48	01	**Electromagnetism:** Introduction to magnetic fields, The Hall effect, Magnetic field on a current carrying wire, Torque on a current loop, Electromagnetic Induction, Faradays law, Lenz's law, induction furnace	**Quiz**	Text book [1]