



**AL IMAM MOHAMMAD IBN SAUD ISLAMIC UNIVERSITY**  
**COLLEGE OF ENGINEERING**  
**DEPARTMENT OF CIVIL ENGINEERING**

Course Information	
Course Code, Number & Name	PHYS117 Physics I <b>Total Credits: 3</b> (Theory Hours: 3, Tutorial: 1)
Prerequisite/s	None

Course Description
Vectors. Motion in one, two and three dimension. Acceleration and free fall, force and motion, and analysis of forces. Newton's laws. Circular motion. Work: the transfer of mechanical energy. Conservation of momentum. Rotation. Conservation of angular momentum. Elasticity and Fluid mechanics

Textbook	
Title	Physics
Author	Halliday D. and Resnick R.
Publisher	John wiley & sons

Course Contents
<p><b>Vectors:</b> Coordinate Systems in 3 dimensions, Vectors and scalar quantities, Properties of vectors, Components of a vector and unit vectors.</p> <p><b>Motion in 1 Dimension:</b> Position and displacement, Average velocity, Instantaneous velocity, Acceleration and instantaneous acceleration, One-dimensional motion with constant acceleration.</p> <p><b>Motion in 2 and 3 Dimensions:</b> The position, Velocity and acceleration vectors in 3 dimensions, Projectile Motion.</p> <p><b>Force and Motion:</b> Newton's first Law, Force and mass, Newton's second Law, Newton's third Law, Applications of Newton's Laws, Frictional force, Circular motion with uniform acceleration</p> <p><b>Kinetic Energy and Work:</b> Work done by a constant force, Scalar product, Kinetic energy and work kinetic energy theorem, Work done by a spring force (a variable force).</p> <p><b>Potential Energy:</b> Potential energy of a system, Conservative and neoconservative forces, Conservation of mechanical energy, Changes in mechanical energy for neoconservative forces, Relationship between conservative forces and potential energy.</p> <p><b>Center of Mass and Linear Momentum:</b> The Center of mass, Motion of a system of particles, Linear momentum and impulse, Conservation of linear momentum, Collisions in one dimension (Inelastic, Elastic). Collisions in two dimensions (Inelastic, Elastic).</p> <p><b>Rotation:</b> Angular position, velocity and acceleration, Rotational kinematics; rotational motion with constant angular acceleration, Angular and linear quantities, Rotational kinetic energy, Calculation of moments of inertia, Torque, Relationship between torque and angular acceleration. Work, Power, and Energy in Rotational Motion. Rolling Motion of a Rigid Object. Rolling, Torque and angular momentum; The vector product and torque, Angular momentum, Angular momentum of a rotating rigid object. Conservation of angular momentum.</p> <p><b>Equilibrium and Elasticity:</b> The conditions for equilibrium, The center of gravity, Examples of static equilibrium.</p>

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**Academic Coordinator**

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**Official Stamp**