



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

<b>Course Information</b>	
<b>Course Code, Number &amp; Name</b>	PHYS118 Physics II <b>Total Credits: 3</b> (Theory Hours: 3, Tutorial: 1)
<b>Prerequisite/s</b>	PHYS117 Physics I, PHYS119 Physics I Lab.

<b>Course Description</b>
Oscillations. Sound waves. Heat and Thermodynamics. Electricity and Magnetism: Coulomb's law, electric fields, Gauss' Law, electric potential, potential energy, capacitance, currents and resistance. Electrical energy and power, direct current circuits, Kirchoff's rules. Magnetic fields, motion of charged particle in a magnetic field, sources of the magnetic field and energy in a magnetic field. Ampere's law, Faraday's law of induction, self-inductance. Alternating current circuits, the RLC series circuit, power in an A.C. circuit, resonance in RLC services circuit.

<b>Textbook</b>	
<b>Title</b>	Physics
<b>Author</b>	Halliday D. and Resnick R.
<b>Publisher</b>	John Wiley & sons

<b>Course Contents</b>
<p><b>Electric Fields:</b> Properties of electric charges, Charging objects by induction, Coulomb's law, Electric field, Electric field of a continuous charge distribution, Electric field lines, Motion of a charged particle in a uniform electric field.</p> <p><b>Gauss's Law:</b> Electric flux, Gauss's law, Application of Gauss's law to various charge distributions, Conductors in electrostatic equilibrium.</p> <p><b>Electric Potential:</b> Electric potential and potential difference, Potential difference in a uniform electric field, Electric potential and potential energy due to point charges, Obtaining the value of the electric field from the electric potential, Electric potential due to continuous charge distributions, Electric potential due to a charged conductor.</p> <p><b>Capacitance and Dielectrics:</b> Definition of capacitance, calculating capacitance, Combinations of capacitors, Energy stored in a charged capacitor, Capacitors with dielectrics, Electric dipole in an electric field.</p> <p><b>Direct Current Circuits:</b> Electric current, Resistance, Resistance and temperature, Electrical power, Electromotive force, Resistors in series and parallel, Kirchoff's rules, RC circuits.</p> <p><b>Sources of the Magnetic Field:</b> Magnetic fields and forces, Motion of a charged particle in a uniform magnetic field, Magnetic force acting on a current-carrying conductor, Torque on a current loop in a uniform magnetic field, Biot-Savart law, Magnetic force between two parallel conductors, Ampère's law, Magnetic field of a Solenoid, Gauss's law in magnetism.</p> <p><b>Faraday's Law and Inductance:</b> Faraday's law of induction, Motional emf, Lenz's law, Induced emf, Self-induction and Inductance, RL circuits, Energy in a magnetic field, Mutual inductance, RLC Circuit.</p> <p><b>Alternating-Current Circuits:</b> AC sources, Resistors in an AC circuit, Inductors in an AC circuit, Capacitors in an AC circuit, RLC series circuit, Power in an AC circuit, Resonance in a series RLC circuit, Transformer and power transmission.</p>

**Academic Coordinator**

**Official Stamp**