A Correlation of

Physics for Scientists and Engineers

A Strategic Approach

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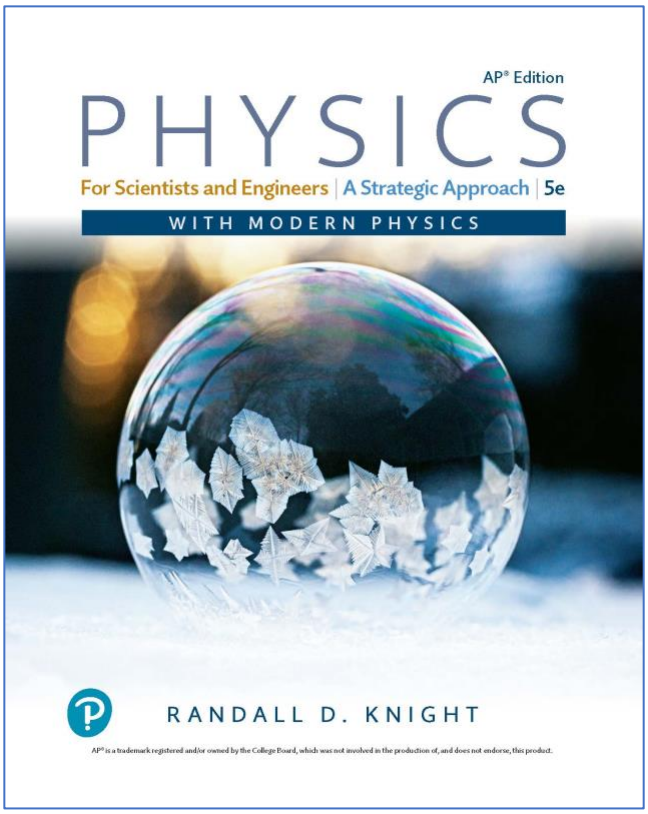

To the

AP® Physics C: Electricity and Magnetism

Course Framework (Fall 2024)

Pearson

Table of Contents

The units above reflect the College Board's AP® Physics C: Electricity and Magnetism Course Framework.

Unit 8: Electric Charges, Fields, and Gauss's Law (6 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
8.1 Electric Charge and Electric Force	8.1.A Describe the electric force that results from the interactions between charged objects or systems. 8.1.B Describe the electric and gravitational forces that result from interactions between charged objects with mass. 8.1.C Describe the electric permittivity of a material or medium.	22.1 The Charge Model 22.2 Charge 22.3 Insulators and Conductors 22.4 Coulomb's Law
8.2 Conservation of Electric Charge and the Process of Charging	8.2.A Describe the behavior of a system using conservation of charge.	22.2 Charge 22.3 Insulators and Conductors
8.3 Electric Fields	8.3.A Describe the electric field produced by a charged object or configuration of point charges. 8.3.B Describe the electric field generated by charged conductors or insulators.	22.5 The Electric Field 23.1 Electric Field Models 23.2 The Electric Field of Point Charges
8.4 Electric Fields of Charge Distributions	8.4.A Describe the electric field resulting from a given charge distribution.	23.3 The Electric Field of a Continuous Charge Distribution

		23.4 The Electric Fields of Some Common Charge Distributions

Unit 8: Electric Charges, Fields, and Gauss's Law (6 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
8.5 Electric Flux	8.5.A Describe the electric flux through an arbitrary area or geometric shape.	24.2 The Concept of Flux 24.3 Calculating Electric Flux
8.6 Gauss's Law	8.6.A Describe the properties of a charge distribution by applying Gauss's law.	24.1 Symmetry 24.4 Gauss's Law 24.5 Using Gauss's Law 31.4 Maxwell's Equations

Unit 9: Electric Potential (3 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
9.1 Electric Potential Energy	9.1.A Describe the electric potential energy of a system.	25.1 Electric Potential Energy 25.2 The Potential Energy of Point Charges 25.3 The Potential Energy of a Dipole
9.2 Electric Potential	9.2.A Describe the electric potential due to a configuration of charged objects. 9.2.B Describe the relationship between electric potential and electric field.	25.4 The Electric Potential 25.5 The Electric Potential Inside a Parallel-Plate Capacitor 25.6 The Electric Potential of a Point Charge 25.7 The Electric Potential of Many Charges 26.1 Connecting Potential and Field 26.2 Finding the Electric Field from the Potential
9.3 Conservation of Electric Energy	9.3.A Describe changes in energy in a system due to a difference in electric potential between two locations.	25.4 The Electric Potential

Unit 10: Conductors and Capacitors (4 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
10.1 Electrostatics with Conductors	10.1.A Describe the charge distribution within a conductor.	22.3 Insulators and Conductors 24.6 Conductors in Electrostatic Equilibrium 26.3 A Conductor in Electrostatic Equilibrium
10.2 Redistribution of Charge between Conductors	10.2.A Describe the movement of charge and the resulting interactions when conductors physically contact each other.	22.3 Insulators and Conductors 28.8 Getting Grounded
10.3 Capacitors	10.3.A Describe the physical properties of a parallel-plate capacitor.	23.5 The Parallel-Plate Capacitor 23.6 Motion of a Charged Particle in an Electric Field 25.5 The Electric Potential Inside a Parallel-Plate Capacitor 26.5 Capacitance and Capacitors 26.6 The Energy Stored in a Capacitor
10.4 Dielectrics	10.4.A Describe how a dielectric inserted between the plates of a capacitor changes the properties of the capacitor.	26.7 Dielectrics

Unit 11: Electric Circuits (8 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
11.1 Electric Current	11.1.A Describe the movement of electric charges through a medium.	27.1 The Electron Current 27.2 Creating a Current 27.3 Current and Current Density 27.4 Conductivity and Resistivity
11.2 Simple Circuits	11.2.A Describe the behavior of a circuit.	28.1 Circuit Elements and Diagrams 28.2 Kirchhoff's Laws and the Basic Circuit
11.3 Resistance, Resistivity, and Ohm's Law	11.3.A Describe the resistance of an object using physical properties of that object. 11.3.B Describe the electrical characteristics of elements of a circuit.	27.5 Resistance and Ohm's Law
11.4 Electric Power	11.4.A Describe the transfer of energy into, out of, or within an electric circuit, in terms of power.	28.3 Energy and Power
11.5 Compound Direct Current Circuits	11.5.A Describe the equivalent resistance of	28.4 Series Resistors 28.5 Real Batteries

	multiple resistors connected in a circuit. 11.5.B Describe a circuit with resistive wires and a battery with internal resistance. 11.5.C Describe the measurement of current and potential difference in a circuit.	28.6 Parallel Resistors

Unit 11: Electric Circuits (8 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
11.6 Kirchhoff's Loop Rule	11.6.A Describe a circuit or elements of a circuit by applying Kirchhoff's loop rule.	26.2 Finding the Electric Field from the Potential 28.2 Kirchhoff's Laws and the Basic Circuit
11.7 Kirchhoff's Junction Rule	11.7.A Describe a circuit or elements of a circuit by applying Kirchhoff's junction rule.	27.3 Current and Current Density 28.2 Kirchhoff's Laws and the Basic Circuit
11.8 Resistor Capacitor (RC) Circuits	11.8.A Describe the equivalent capacitance of multiple capacitors. 11.8.B Describe the behavior of a circuit containing combinations of resistors and capacitors.	28.9 RC Circuits

Unit 12: Magnetic Fields and Electromagnetism (4 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
12.1 Magnetic Fields	12.1.A Describe the properties of a magnetic field. 12.1.B Describe the magnetic behavior of a material as a result of the configuration of magnetic dipoles in the material. 12.1.C Describe the magnetic permeability of a material.	29.1 Magnetism 29.2 The Discovery of the Magnetic Field 29.5 Magnetic Dipoles 29.10 Magnetic Properties of Matter 31.4 Maxwell's Equations
12.2 Magnetism and Moving Charges	12.2.A Describe the magnetic field produced by moving charged objects.	29.3 The Source of the Magnetic Field: Moving Charges 29.7 The Magnetic Force on a Moving Charge

	12.2.B Describe the force exerted on moving charged objects by a magnetic field.	
12.3 Magnetic Fields of Current-Carrying Wires and the Biot-Savart Law	12.3.A Describe the magnetic field produced by a current-carrying wire. 12.3.B Describe the force exerted on a current-carrying wire by a magnetic field.	29.4 The Magnetic Field of a Current 29.8 Magnetic Forces on Current-Carrying Wires
12.4 Ampere's Law	12.4.A Use Ampère's law to describe the magnetic field created by a moving charge carrier.	29.6 Ampere's Law and Solenoids 31.4 Maxwell's Equations

Unit 13: Electromagnetic Induction (6 topics)		
Topic	**Learning Objectives**	**Physics for Scientists and Engineers Chapters and Sections**
13.1 Magnetic Flux	13.1.A Describe the magnetic flux through an arbitrary area or geometric shape.	30.3 Magnetic Flux
13.2 Electromagnetic Induction	13.2.A Describe the induced electric potential difference resulting from a change in magnetic flux.	30.4 Lenz's Law 30.5 Faraday's Law 30.6 Induced Fields 31.4 Maxwell's Equations 31.5 Electromagnetic Waves
13.3 Induced Currents and Magnetic Forces	13.3.A Describe the force exerted on a conductor due to the interaction between an external	29.8 Magnetic Forces on Current-Carrying Wires 29.9 Forces and Torques on Current Loops 30.1 Induced Currents

	magnetic field and an induced current within that conductor.	30.2 Motional emf
13.4 Inductance	13.4.A Describe the physical and electrical properties of an inductor.	30.8 Inductors
13.5 Circuits with Resistors and Inductors (LR Circuits)	13.5.A Describe the physical and electrical properties of a circuit containing a combination of resistors and a single inductor.	30.10 LR Circuits
13.6 Circuits with Capacitors and Inductors (LC Circuits)	13.6.A Describe the physical and electrical properties of a circuit containing a combination of capacitors and a single inductor.	30.9 LC Circuits