



## CORE COURSE PERFORMANCE OBJECTIVES

The student will be able to:

1. Solve problems involving reviewed mechanics. (CCC 2, 7, 9)
2. Solve problems involving electrostatics. (CCC 2, 7, 9)
3. Solve problems involving electric potential. (CCC 2, 7, 9)
4. Solve problems involving electric current. (CCC 2, 7, 9)
5. Solve problems involving direct current circuits. (CCC 2, 7, 9)
6. Solve problems involving magnetism. (CCC 2, 7, 9)
7. Solve problems involving electromagnetic induction and AC circuits. (CCC 2, 7, 9)
8. Solve problems involving selected topics in modern physics. (CCC 2, 7, 9)
9. Investigate and solve problems using experimental techniques. (CCC 1, 2, 3, 7, 9)

## MEASURABLE PERFORMANCE OBJECTIVES

- 1. Solve problems involving reviewed mechanics. (CCC 2, 7, 9)**
  - 1.1 Define fundamental and derived units, and convert from one set of units to another.
  - 1.2 Define speed, velocity and acceleration and calculate these parameters using motion equations.
  - 1.3 Define scalar and vector quantities and calculate resultant of two or more vectors.
  - 1.4 State and apply Newton's Laws to different situations. Define mass and weight.
  - 1.5 Define work, energy, potential energy, kinetic energy, power and efficiency.
  - 1.6 State and apply the principle of conservation of energy.
- 2. Solve problems involving electrostatics. (CCC 2, 7, 9)**
  - 2.1 Define electric charge and electric field.
  - 2.2 State and apply Coulomb's Law.
  - 2.3 Calculate the resultant electric fields using Superposition of Electric Forces.
  - 2.4 Define electric flux. State and apply Gauss's Law.
- 3. Solve problems involving electric potential. (CCC 2, 7, 9)**
  - 3.1 Define electric potential energy, voltage and equipotential surfaces.
  - 3.2 Define and calculate charge, voltage, capacitance, electric field and energy stored in capacitors with various dielectrics.

- 4. Solve problems involving electric current. (CCC 2, 7, 9)**
  - 4.1 Define and calculate electric current, electromotive force, resistance, resistivity, power and energy in electrical circuits.
- 5. Solve problems involving direct current circuits. (CCC 2, 7, 9)**
  - 5.1 Distinguish between series and parallel circuits.
  - 5.2 List and apply Kirchhoff's rules to various circuits.
  - 5.3 Explain home power distribution.
- 6. Solve problems involving magnetism. (CCC 2, 7, 9)**
  - 6.1 Explain magnets, magnetic materials and magnetic fields. Describe Oersted's discovery.
  - 6.2 Calculate magnetic forces on electrical currents and on moving charged particles.
  - 6.3 Calculate magnetic field due to a current carrying wire.
  - 6.4 Calculate torque on a current loop. Explain how galvanometers, ammeters and voltmeters work.
  - 6.5 State and apply Ampere's Law.
- 7. Solve problems involving electromagnetic induction and AC circuits. (CCC 2, 7, 9)**
  - 7.1 State and apply Faraday's Law. Calculate motional emf.
  - 7.2 Discuss the principles behind generators, motors, and transformers.
  - 7.3 Calculate inductance, energy stored in a magnetic fields.
  - 7.4 State and apply laws of electromagnetism.
  - 7.5 State and use Maxwell's equations.
  - 7.6 Analyze RL, RC, RLC series and resonant circuits.
- 8. Solve problems involving selected topics in modern physics. (CCC 2, 7, 9)**
  - 8.1 Distinguish between n-type and p-type semiconductors.
  - 8.2 Calculate current due to motion of holes and electrons in pn junction.
  - 8.3 Analyze and calculate current and voltage in rectifier circuits.
  - 8.4 Describe solar cells and Light-Emitting Diodes. Calculate wavelengths, energy of the band gap and efficiency.
- 9. Investigate and solve problems using experimental techniques. (CCC 1, 2, 3, 7, 9)**
  - 9.1 Experimentally determine vector resultant for a given set of forces.
  - 9.2 Experimentally map an electric field and equipotential contours.
  - 9.3 Experimentally determine the transfer of charge from one capacitor to another.
  - 9.4 Experimentally determine the voltage across each capacitor in a given circuit.
  - 9.5 Experimentally determine current and voltage in a circuit using ammeters/voltmeters.

- 9.6 Experimentally determine the value of an RC time constant.
- 9.7 Experimentally determine the output of an unbalanced Wheatstone bridge.
- 9.8 Experimentally determine the resistance of a series/parallel combination of resistors.
- 9.9 Program a graphic calculator to be used as a timing device.
- 9.10 Construct an electromagnet.
- 9.11 Construct and test an electric motor.
- 9.12 Experimentally determine the current produced by electromagnetic induction.
- 9.13 Experimentally determine the value of capacitance of a capacitor in an RC circuit.
- 9.14 Experimentally determine the value of inductance of an inductor in an RL circuit.
- 9.15 Experimentally observe the voltage/current phase relationship in an RLC circuit using an oscilloscope.
- 9.16 Experimentally determine the IV-characteristic curve a semiconductor diode.
- 9.17 Construct a semiconductor light-emitting diode circuit with the proper current-limiting resistor.

## **EVALUATION CRITERIA**

Students will demonstrate proficiency on all Measurable Performance Objectives at least to the 75% level. The grade will be determined using the College Grading System:

92 - 100	A
83 - 91	B
75 - 82	C
0 - 74	R

**Students should refer to the Student Handbook for information on Academic Standing Policy, Academic Honesty Policy, Students Rights and Responsibilities and other policies relevant to their academic progress.**