

COLLEGEWIDE COURSE OUTLINE OF RECORD

PHYS 221 HEAT, ELECTRICITY AND OPTICS

COURSE TITLE: Heat, Electricity and Optics

COURSE NUMBER: PHYS 221

PREREQUISITES: PHYS 220 Mechanics and MATH 212 Calculus II

SCHOOL: Liberal Arts and Sciences

PROGRAM: Liberal Arts

CREDIT HOURS: 5

CONTACT HOURS: Lecture: 4 Lab: 2

DATE OF LAST REVISION: Fall, 2011

EFFECTIVE DATE OF THIS REVISION: Fall, 2015

CATALOG DESCRIPTION: A calculus based physics course that provides a detailed analysis of heat and energy; kinetic theory; elementary thermodynamics; heat transfer; electrostatics; electric current; AC and DC circuit analysis; electromagnetism; magnetic properties of matter; geometrical and physical optics. Includes lab.

MAJOR COURSE LEARNING OBJECTIVES: Upon successful completion of this course the student will be expected to:

1. Compute the quantity of heat transfer using concepts of heat capacity and latent heat.
2. Perform computations using kinetic theory and the laws of thermodynamics.
3. Study the forces between charges, electric fields, electric potential, and capacitance.
4. Calculate the force on charges when moving in a magnetic field.
5. Analyze the working of circuits carrying direct currents.
6. Calculate the magnetic field produced by a current carrying wire and discuss the magnetic properties of matter.
7. Analyze the circuits carrying alternating currents.
8. Solve basic problems in electromagnetic induction..
9. Discuss the behavior and calculate the properties of light in terms of reflection, refraction and describe image formation by mirrors and lenses.
10. Discuss the physical properties of light: interference, diffraction, and polarization.

COURSE CONTENT: Topical area of study include –

Thermodynamics and Heat

Thermal Conduction

Electric Charge; Coulomb's Law

Gauss' Law

Capacitance and Dielectrics

Ohm's Law

Magnetic force on a current

Electromagnetic induction

Thermal Expansion

Kinetic Theory of Gases

Electric Field

Electric Potential, Electric Energy

Current, resistance, electromotive force

AC and DC circuit analysis

Magnetism and the sources
of magnetic fields

Maxwell's Equations

Electromagnetic waves

Geometric optics:

1. Image formation by mirrors
2. Image formation by lenses

Physical optics:

1. Interference
2. Diffraction
3. Polarization

Optical instruments

LAB CONTENT: Laboratory experiments will be selected from the topics above.

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