

1. Department, Course Number, and Course Title:

DEPARTMENT OF PHYSICS AND ASTRONOMY

PHYSICS 204 GENERAL PHYSICS (4)

2. Designation: Required Elective
Lower Division Upper Division

3. Course Description: Continuation of electricity and magnetism including oscillations and waves; geometrical and physical optics.

4. Prerequisites: PHYS 203; MATH 209 (prerequisite or corequisite)

5. Text and Materials: Physics for Scientist and Engineers, 6th Ed. Serway R., Thomson, 2004
Phys 100/200 Supplement & Notes, Carr
Phys 204 Lab Manual

6. Course Objectives: Students are introduced to electrodynamics and Maxwell's equations. They will learn about time dependent electromagnetic phenomena, including the concept of inductance. Circuit analysis will be expanded to include inductive elements. They will learn about the properties of electromagnetic waves and study light and optics, both from the point of view of geometrical optics and physical optics.

Course Outcomes

- Students will learn about motional emf, Faraday's law of induction, and the connections between dynamic electric and magnetic fields.
- Students will be introduced to the concept of inductance and how this can be used along with capacitance and resistance to solve problems in alternating current circuit analysis. Oscillations in LC circuits and power in an AC circuit will be developed.
- Students will learn that Maxwell's equations predict the existence of electromagnetic waves that carry energy and momentum, and are responsible for the phenomenon of light, among other things.
- Students will learn how to use geometrical optics to develop a first order understanding lenses and optical devices.
- Students will learn how physical optics affects the operation of optical devices through the phenomena of interference, diffraction and polarization

7. Topics Covered: (in Order of Presentation)

- Faraday's law of induction (Ch. 31)
- Inductance, energy in a magnetic field, RL and LC circuits (Ch. 32)
- Alternating current circuits, power in an AC circuit (Ch. 33)
- Electromagnetic waves, properties of E.M. waves (Ch. 34)
- Nature of light and laws of geometrical optics (Ch. 35)
- Geometrical optics and its applications (Ch. 36)
- Interference of light waves, double slit interference experiments, interference in thin films (Ch. 37)
- Diffraction and polarization, resolution of single slit circular apertures, diffraction grating, x-ray diffraction (Ch. 38)

8. Class Schedule: Number of Sessions per week: 2 lectures; 1 recitation; 1 laborator
Duration of each session: Lecture 1 hr, 15 min
Recitation 50 minutes
Laboratory 2 hours, 30 min

9. Contribution of course to meeting the professional component:

This course is part of the one year (48 quarter units) of Basic Mathematics and Science.
Science 4 units

10. Relationship of course to program objectives:

This course relates to the program objectives by contributing to the following measurable outcomes at the level indicated for all engineering graduates:

Knowledge outcomes:

- an ability to apply knowledge of mathematics, science, and engineering (abet a)
- knowledge of current events and societal contemporary issues -- non-engineering related. (abet j)
- knowledge of measurement techniques

Skill outcomes:

- an ability to design and conduct experiments as well as to analyze and interpret data (abet b)
- an ability to communicate effectively (abet g)
- an ability to think in a logical sequential process

Attitudes Outcome:

- a desire to be a flexible and adaptable team player (collaborative attitude)

11. Prepared by:

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