GROSSMONT COLLEGE

Official Course Outline

PHYSICS 241 – LIGHT, OPTICS, AND MODERN PHYSICS

1.	Course Number	Course Title	Semester Units	Hours
	PHYC 241	Light, Optics, and Modern Physics	4	3 hours lecture 3 hours laboratory

2. Course Prerequisites

A "C" or "CR" grade or higher in Physics 240 or equivalent. A "C" or "CR" grade or higher or concurrent enrollment in Math 281 or equivalent.

3. Catalog Description

This is the third semester of a three semester Calculus level sequence course designed for science, mathematics, physics, and engineering students. The topics of wave motion, electromagnetic waves, optics, special relativity, and atomic and nuclear physics are introduced at the beginning level with reliance upon ability to apply topics introduced in Physics 140 and 240. The laboratory provides experiments in microwaves, optics, lasers, holography, and nuclear counting.

4. Course Objectives

The student will be able to:

a. Discuss basic concepts in electromagnetic waves, optics of wave motion, special relativity, atomic and nuclear physics and define the laws and principles of fundamental physics to these topics.
b. Examine physical events or situations, construct proper equations and solve problems involving specific topics.
c. Construct and use basic physical principles to optical elements, microwave equipment and holography and understand the interference and energy exchange in such equipment.
d. Set up laboratory apparatus with which the laws and equations studied in the course can be seen in action.
e. Assess the importance of measurement errors in laboratory experiments and evaluate experimental results in terms of expected results.

5. Instructional Facilities

a. Laboratory stations with water, gas, electricity, and air outlets at each station.
b. Blackout facility in the class and lab room.
c. Projector and internet connection.
d. Computer lab.

6. Special Materials Required of Student

a. Laboratory manual.
b. Calculator.
c. Notebooks.
d. Graph paper.

7. Course Content

a. The basic topics of electromagnetic waves, Maxwell's equations, geometrical optics, interference, diffraction, light and quantum physics, waves and particles, atomic physics, electrical conductivity, and nuclear physics are covered.
b. Each week a lab experiment is performed which relates to the topic covered in the lecture. These experiments are on microwaves, lenses and mirrors, telescopes and microscopes, prism and diffraction grating spectrometers, holography, Plank's constant, and nuclear counting with ionization and G.M. detectors. A scintillation detector is used with a 128 multi-channel analyzer for gamma detection.

8. Method of Instruction

a. Lecture, computer aided instruction, and demonstrations in lecture hours.
b. Student-performed lab experiments.

9. Methods of Evaluating Student Performance

a. Written problems, short answer and essay tests, quizzes.
b. Lab reports.
c. Performance in lecture recitation and in lab operations.
d. Written final exam.

10. Outside Class Assignments

a. Required reading in the text.
b. Library research.
c. Completion of written laboratory work.

11. Texts

a. Required text(s):
(1) Tipler, Paul and Gene Mosca. Physics for Scientists and Engineers. 5th edition. Gordonsville, VA: W. H. Freeman & Co., 2004.
(2) Knight, Randall. Physics for Scientists and Engineers. Boston, MA: Addison Wesley, 2004.
b. Supplementary texts and workbooks:
Lab report book.