Syllabus for
PHY 211 Introduction to Modern Physics Lecture
3 Credit hours
Spring 2000

I. COURSE DESCRIPTION

An introductory treatise of theory of relativity, atomic structured, matter waves, quantum mechanics, statistical mechanics, solid-state theory, radioactivity, and nuclear reactions.
Prerequisite: PHY 112 Lecture.
Corequisite: PHY 211 Lab.

II. COURSE GOALS

The course will enable the student to:

A. possess the background to deal intelligently with the problems occurring in this nuclear age.

B. possess a basis for specialization in many fields of modern science dealing with the physical world.

C. realize and appreciate the contribution of physics and physicists to the present-day society.

D. develop critical thinking skills.

E. analyze and apply mathematical formulations.

F. approach the learning of a subject in a consistent and disciplined manner.

III. COURSE OBJECTIVES

Upon completion of this course the student should be able to:

A. discuss the historical development of physics in the twentieth century.

B. identify and associate the technical names and terms of significant men in modern physics through:
   1. defining or identifying a given name or term.
   2. matching a given statement with the appropriate term or name.

C. demonstrate a comprehension of the basic concepts of classical and quantum physics by:
   1. writing a paragraph or a given concept.
   2. selecting from several choices the proper description of a given topic.

D. show acquaintance with the basic laws of modern physics as evidenced by:
describing in writing a given physical law.
   1. writing the mathematical formulation of a given law.
   2. identifying a particular law when expressed by a given mathematical formula.

E. apply the terms, concepts, and basic laws of modern physics by:
   1. solving problems similar to those in the textbook.
   2. solving an unfamiliar problem using familiar laws and concepts.

F. demonstrate the ability for critical thinking analysis, as evidenced by:
   1. organizing presentations of papers or answers to questions.
   2. deriving results from given information.

IV. TEXTBOOKS

A. Required Text
   1. Serway, Moses, and Moyer Modern Physics,. (Saunders, 1989).

B. References
   1. Thornton and Rex.Moderrn Physics for Scientists and Engineers. 2nd Ed., , (Saunders, 1993).
   2. Serway, Moses, and Moyer. Modern Physics. Saunders, 1989.
   3. Physics Today, and other journals.

V. POLICIES AND PROCEDURES

A. University Policies and Procedures

   1. Attendance at each class or laboratory is mandatory at Oral Roberts University.
   2. Double cuts will be assessed for absences immediately preceding or following holidays.
   3. Excessive absences can reduce a student's grade or deny credit for the course.
   4. Students taking a late exam because of an unauthorized absence will be charged a late exam fee.
   5. Students and faculty at Oral Roberts University adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, video, multimedia, or computer software.

B. Evaluation Procedures

   1. Four one-hour exams will be given throughout the semester. At the end of the semester, the average of the exams will account for 60 percent of the final course grade.
   2. Homework will be assigned in the class and will be due at the beginning of class on the due date. Points will be taken off for late homework. The semester's homework will account for 15 percent of the final course grade. The instructor may assign a term paper. The final exam will account for 25 percent of the course grade.
   3. The performance expected following each part of each module listed under VI Topic Listing and Sequence is the performance described in II Terminal Objectives, as applied to the topics covered in that part of that module.
   4. Students and faculty a Oral Roberts University adhere to all laws addressing the ethical use of others' materials, whether it be in the form of print, video, multimedia, or computer software.

C. Other Procedures

Topic Listing and Sequence

1. Dual Nature of Particles and Waves
2. Atomic Models
3. Special Theory of Relativity
4. Quantum Mechanics
5. Statistical Mechanics
6. Solid State Physics
7. Atomic Nucleus
8. Nuclear Reactions

VI. COURSE CALENDAR

Week	Topic	Reading
1	Classical Physics Dilemma	Chapter 1
2	Special Theory of Relativity	Chapter 2
3	General Theory of Relativity	Chapter 3
	Test 1--Chapters 1-3	
4	Experimental Basis for Quantum Theory	Chapter 4
5	Atomic Structure and the Nucleus	Chapter 5
6	Matter Waves	Chapter 6
7	Quantum Mechanics	Chapter 7
	Test 2--Chapters 4-7	
8	Hydrogen Atom	Chapter 8
9	Many Electron Atom	Chapter 9
10	Statistical Physics	Chapter 10
11	Molecular Structure and Solids	Chapter 11
	Test 3--Chapters 8-11	
12	Solid State and Semiconductor Devices	Chapter 12
13	Radioactivity and Nuclear Structure	Chapter 13
14	Nuclear Reactions and Reactors	Chapter 14
15	Elementary Particle	Chapter 15
	Review and Test 4--Chapters 12-15	
16	Final Examination	

Homework problems will be assigned in class, and must be completed and ready to be discussed the following class period after assignments.

Roger Hartman
Name of Instructor

PHY 211
Course No.

Intro. Modern Physics
Title of Course

Engineering and Physics
Name of Department

MISSION

The lifestyle at ORU is rooted in the word "Wholeness." ORU seeks to educate the whole person, with balanced emphasis placed on the development of mind, spirit, and body.

GENERAL OUTCOMES

1. Spiritual Development
2. Physical Development
3. Communication
4. Analysis
5. Problem Solving
6. Valuing in Decision-making
7. Social Interaction
8. Global Perspectives
9. Effective Citizenship
10. Aesthetic Responsiveness

MAJOR OUTCOMES

Analysis/Problem Solving: Has the ability to analyze, design, and obtain effective solutions to real world engineering and physics problems.

Communication/Team Work: Demonstrates ability to work on teams and communicate effectively in written and oral forms.

Fundamental Knowledge Base: Possesses fundamental knowledge of principles of engineering, physical sciences, and mathematics.

Christian Stewardship and Ethics: Ethically applies engineering technology to the solution of human problems using Christian principles.

COURSE GOALS

The student will be able to:

apply the knowledge in analyzing and solving problems.

be able to communicate ideas by working on the board and answering questions, as well as writing pre-lecture notes, journals and reports.

comprehend basic ideas in heat, electricity magnetism, light and modern physics. Be scientifically literate to make decisions concerning environment and other global problems.

ASSESSMENT OF COURSE GOALS

STIMULI

Examinations/Quizzes
Class/Group discussions
Portfolios/Journals
Homework/Reports

CRITERIA

Works out problems in a systematic way.

Performs well in exams.

Participates in class/group discussions.

Demonstrates understanding of concepts through journal and report writing.

Prepares for class by writing prelecture notes. Demonstrates preparedness by being quizzed over material.