Syllabus for
PHY 112—Physics II Laboratory
1 Credit Hour
Fall 2002

I. COURSE DESCRIPTION

Experiments in wave motion, sound, electricity, magnetism and light to supplement PHY 112.
Corequisite: PHY 112 Lecture.
Lab fee: $30.

II. COURSE GOALS

The purpose of this course is to enable the student to do the following:

A. gain practical experience for the concepts discussed in the Physics II lecture course.

B. understand the experimental techniques generally applicable to research.

C. utilize some of the basic instruments and techniques applied by physicists.

D. understand the theory taught in lecture and relate this knowledge to the real world via experimentation, so that each concept is understood as a whole with complementary aspects.

E. develop a way of dealing with unexpected situations that often arise in making measurements of a physical property.

F. use practical applications of probability theory and statistical analysis.

III. COURSE OBJECTIVES

As a result of successfully completing this course the student will be able to do the following:

A. measure the frequency of a vibrating string

B. calculate the wave velocity in the string

C. measure resonance length of the air columns

D. measure the velocity of sound in the air

E. apply Coulomb's Law

F. investigate some electric and magnetic field configurations

G. measure the current, voltage, and resistance in a simple electrical circuit

H. investigate the circuit characteristics of resistors in series and parallel

I. operate a slide-wire wheatstone bridge

J. measure an unknown resistance using a wheatstone bridge

K operate the potentiometer

L measure resistances accurately using the potentiometer

M measure the joule equivalent of the calorie of heat energy

N measure electric heating

O. construct an RC circuit

P. measure the time constant of an RC circuit

Q measure the amount, direction, and duration of an induced current

R. construct a transformer

S. apply the laws of reflection

T. apply the laws of refraction

U. measure the focal length of several lenses and mirrors

V. state the parameters that govern the use of spherical mirrors and lenses1.

W. describe the use of a spectrometer

X. describe the optical spectra

IV. TEXTBOOKS

A. Required Textbook
Wilson Jerry D. Physics Laboratory Experiment. 5th Edition. Lexington: Houghton-Mifflin Co., 1998.

B. Other Recommended Reading Material
Serway, Raymond A. Physics for Scientists & Engineers. Chicago: Saunders College Publishing, 1996.

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.
6. Final exams cannot be given before their scheduled times. Students need to check the final exam schedule before planning return flights or other events at the end of the semester.

B. Course Policies and Procedures

1. Evaluation Procedures – Grading

a. The laboratory manual for this course contains procedural instructions, theoretical explanations, and relevant questions for each experiment. Results from the procedures and answers to the questions will be written in the designated areas within the manual. An abstract of the experiment should be written on a separate piece of paper and attached to the report. The abstract should be concise and to the point, not over half a page in length. It should contain the measured value(s) as obtained, along with a comparison to the expected value(s). The measured values should be expressed as ➡⬅↖➡ in standard error form. It should be written in present tense, third person, impersonal form. In addition, the report should contain a conclusion and an error analysis, consistent with the probability and statistical analysis section of the manual.

b. The student will have three hours in the laboratory to complete each week's experiment and unless instructed otherwise must hand in his/her typewritten report at the beginning of the next lab period.

c. Each student is expected to read the experiment before the lab period and review the Advance Study Assignment that precedes each experiment.

d. Some laboratory time will be reserved to work on group projects. Each group will tackle a problem which will simulate a real life engineering project and will present one of these projects in the laboratory at a yet to be determined time during the Fall semester. This part of the course will be jointly evaluated in the laboratory as well as the lecture course. It can offset some written laboratory reports and/or quizzes. (Up to 25% of lab may come from these group projects.)

e. Grading procedure—The grade earned in the class will be an average based upon lab reports, quizzes, and the final exam. One or more group projects may be substituted for some individual laboratory experiments and/or quizzes. In general, the various components of the grade will be as follows:

60%	for 12 lab write-ups (50 pts. each)	=	600 pts.
25%	for lab final (written and/or practical)	=	250 pts.
15%	for 3 quizzes (50 pts. each)	=	150 pts.
100%		Total =	1000 pts.

f. The letter grade will be assigned in accordance with the following percentage ranges:

A = 100-90
B = 89-80
C = 79-70
D = 69-60
F = 59-0

2. Other Policies and/or Procedures
   a. Each student is responsible for the University materials that he/she uses during the laboratory period and will be assessed an appropriate fee for any items that are lost, damaged, or broken.
   b. Students should leave their tables and apparatus in good order: i.e., weights put away, instruments returned, scrap paper picked up, etc.

VI. COURSE CALENDAR

Week	**Lab. No.**	**Name**
1	1	Standing Waves in a String. Experiment #18.
2	2	Air Column Resonance. Experiment #19.
3	3	Group Projects.
4	4	Resistance in Series and Parallel. Experiment #33.
5	5	The Measurement of Resistance (Wheatstone Bridge). Experiment #30.
6	6	The Potentiometer. Experiment #28.
		Quiz 1 over Labs 1-4.
7	7	Group Projects.
8	8	The RC Time Constant. Handout.
		Fall Break
9	9	Electromagnetic Induction. Experiment #41.
10	10	Reflection and Refraction. Experiment #44.
		Quiz 2 over Labs 5-8.
11	11	Spherical Mirrors and Lenses. Experiment #45.
12	12	The Transmission Diffraction Grating. The Spectrometer Method. Experiment #50.
13		Lab Makeup and Quiz 3 over Labs 9-12
14		**Final**

VII. ASSESSMENT SUMMARY

Dr. Roger Hartman
Name of Instructor

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

PHY 112 Lab
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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.

Physics II Lab
Title of Course

COURSE OUTCOMES

Plot or measure real world events through laboratory devices:
—Electric and magnetic fields
—Resistors, voltage, and currents
—Period of oscillator
—Time constant
—Induce current
—Nuclear radiation
—Angle of incident and reflecting
—Focal length
—Construction and demonstration of E-M door opener

Engineering and Physics
Name of Department

ASSESSMENT OF COURSE GOALS

STIMULI:

Lab reports: 60% of grade

Quizzes and exams: 15 %

Practicum: 25%

Group projects: variable

CRITERIA:

See stimuli.

Passing Grade “C”