# Syllabus for PHY 112—Physics II Laboratory 1 Credit Hour Fall 2016

#### I. COURSE DESCRIPTION

Experiments in wave motion, sound, electricity, and magnetism. Corequisite: PHY 112 Lecture. Lab fee: \$75.

#### 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. Demonstrate the experimental techniques generally applicable to research.
- C. Utilize some of the basic instruments and techniques applied by physicists.
- D. Apply 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. Study practical applications of probability theory and statistical analysis.

## III. STUDENT LEARNING OUTCOMES FOR THIS COURSE

As a result of successfully completing this course, the student will be able to do the following: A. Measure the period of oscillation of a simple harmonic oscillator.

- B. Calculate the elastic constant of a spring.
- C. Measure resonance length of the air columns.
- D. Measure the velocity of sound in the air.
- E. Apply Coulomb's Law.
- F. Measure some electric and magnetic field configurations.
- G. Measure the current, voltage, and resistance in a simple electrical circuit.
- H. Measure 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 Use Planck's constant to relate light frequency (color) and energy
- 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 lenses.
- W. Describe the use of a spectrometer.
- X. Describe the optical spectra.

It should be noted that not every one of the laboratory exercises listed under VI Course Calendar will be completely performed and formally written up, but the minimal necessary procedures will be documented to ensure the student's ability to successfully perform at least 75% of the of A through X above list.

## IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

- A. Required Materials
  - 1. Textbooks
    - Custom edition of Wilson, Jerry D., and Cecilia Hernandez-Hall. *Physics Laboratory Experiments*. 8th ed. Boston: Brooks/Cole, 2015ISBN-13: 9781337057936
  - 2. Other Scientific calculator

## V. POLICIES AND PROCEDURES

- A. University Policies and Procedures
  - 1. Attendance at each class or laboratory is mandatory at Oral Roberts University. Excessive absences can reduce a student's grade or deny credit for the course.

- 2. Students taking a late exam because of an unauthorized absence are charged a (\$15) late exam fee.
- 3. Students and faculty at Oral Roberts University must adhere to all laws addressing the ethical use of others' materials, whether it is in the form of print, electronic, video, multimedia, or computer software. Plagiarism and other forms of cheating involve both lying and stealing and are violations of ORU's Honor Code: "I will not cheat or plagiarize; I will do my own academic work and will not inappropriately collaborate with other students on assignments." Plagiarism is usually defined as copying someone else's ideas, words, or sentence structure and submitting them as one's own. Other forms of academic dishonesty include (but are not limited to) the following:
  - a. Submitting another's work as one's own or colluding with someone else and submitting that work as though it were his or hers;
  - b. Failing to meet group assignment or project requirements while claiming to have done so;
  - c. Failing to cite sources used in a paper;
  - d. Creating results for experiments, observations, interviews, or projects that were not done;
  - e. Receiving or giving unauthorized help on assignments.

By submitting an assignment in any form, the student gives permission for the assignment to be checked for plagiarism, either by submitting the work for electronic verification or by other means. Penalties for any of the above infractions may result in disciplinary action including failing the assignment or failing the course or expulsion from the University, as determined by department and University guidelines.

- 4. 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.
- 5. Students are to be in compliance with University, school, and departmental policies regarding Whole Person Assessment (WPA) requirements. Students should consult the WPA handbooks for requirements regarding general education and the students' majors.
  - a. The penalty for not submitting electronically or for incorrectly submitting an artifact is a zero for that assignment.
  - b. By submitting an assignment, the student gives permission for the assignment to be assessed electronically.
- B. Course Policies and Procedures
  - 1. Evaluation Procedures

The grade earned in the class will be an average based on lab reports, and quizzes. 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:
Formal lab reports 45%
Quizzes and competencies relating to the A-Z list in section III 55%

- 3. Other Policies and/or Procedures
  - The lab manual for this course contains nearly all of the necessary a. procedural instructions and theoretical explanations for each experiment to be performed in Physics 112. In some cases it also contains relevant questions to be answered. Results from the procedures and answers to the questions should be written in the designated areas within the manual when appropriate. In other cases a formal laboratory experiment should be written. The instructor will inform the student as to when the lab manual sheets are to be utilized and handed in at the appropriate time. In general, 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  $\times \pm \% \times$  in standard error form. It should be written in present tense, third person, and 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. Sample abstracts will be supplied to the student upon request.
  - b. In general, the student will have ample time to perform the necessary mock ups; make measurements; and collect and record the data in the laboratory session. Graphs, statistical analysis, and write up will take place during the end of the lab. The type written report will usually be collected at the end of the experiment.
  - c. Each student is expected to read the experiment before the lab period and review the Advance Study Assignment that precedes each experiment.
  - d. Each student is responsible for the University materials that he or she uses during the lab period and will be assessed an appropriate fee for any items that are lost, damaged, or broken.
  - e. Students should leave their tables and apparatus in good order (i.e., weights put away, instruments returned, scrap paper picked up, etc.).
  - f. Instructor may change the assignment schedule at any time by verbal or written notification to the class.

# VI. COURSE CALENDAR

Week	Lab No.	Name
1	1	Simple Harmonic Motion—Experiment #16.
2	2	Air Column Resonance—- Experiment #42.
3	3	Fields and Equipotentials,- Experiment # 22
4	4	Resistance in Series and Parallel—Experiment #26
5	5	The Measurement of Resistance (Wheatstone Bridge) — Experiment #24
6	6	Planck's Constant - handout
7	7	Joule Heat, Experiment #27
8	8	The RC Time Constant— Experiment #28
9	9	Electromagnetic Induction— Experiment #52
10	10	Reflection and Refraction—Experiment #30
11	11	Spherical Mirrors and Lenses—Experiment #31
12	12	The Transmission Diffraction Grating; Measuring the Wavelengths of Light—Experiment #35
13		Lab Makeup.
14		Final Exam

# Course Inventory for ORU's Student Learning Outcomes PHY 112—Physics 11 Laboratory Fall 2016

This course contributes to the ORU student learning outcomes as indicated below: Significant Contribution – Addresses the outcome directly and includes targeted assessment. Moderate Contribution – Addresses the outcome directly or indirectly and includes some assessment. Minimal Contribution – Addresses the outcome indirectly and includes little or no assessment. No Contribution – Does not address the outcome.

The Student Learning Glossary at http://ir.oru.edu/doc/glossary.pdf defines each outcome and each of the proficiencies/capacities.

<b>OUTCOMES &amp; Proficiencies/Capacities</b>	Significant	Moderate	Minimal	No
	Contribution	Contribution	Contribution	Contribution

1	Outcome #1 – Spiritually Alive			
	Proficiencies/Capacities			
1A	Biblical knowledge		Х	
1B	Sensitivity to the Holy Spirit		Х	
1C	Evangelistic capability			Х
1D	Ethical behavior		Х	

2	Outcome #2 – Intellectually Alert				
	Proficiencies/Capacities				
2A	Critical thinking	X			
2B	Information literacy		Х		
2C	Global & historical perspectives		Х		
2D	Aesthetic appreciation			Х	
2E	Intellectual creativity		Х		

3	Outcome #3 – Physically Disciplined Proficiencies/Capacities		
3A	Healthy lifestyle		Х
3B	Physically disciplined lifestyle		Х

4	Outcome #4 – Socially Adept			
	Proficiencies/Capacities			
4A	Communication skills	Х		
4B	Interpersonal skills	Х		
4C	Appreciation of cultural & linguistic			Х
	differences			
4D	Responsible citizenship		Х	
4E	Leadership capacity		Х	