Syllabus for
PHY 112—Physics II Lecture
3 Credit Hours
Fall 2015

I. COURSE DESCRIPTION

Calculus-based studies of wave motion, sound, electricity, magnetism, and light. Includes an introduction to modern physics.
Prerequisite: PHY 111 Lecture.
Corequisite: PHY 112L Lab.

II. COURSE GOALS

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

A. Develop the background to deal intelligently with third millennium technological problems in wave motion, electricity and magnetism, light and optics, and modern physics.

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

C. Realize and appreciate the contributions of physics and physicists to the present day society.

D. Analyze and apply mathematical functions in physics.

E. Approach the learning of a subject in a consistent and disciplined manner.

F. Develop critical thinking skills.

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. Identify and associate the technical names of significant terms in physics.
   1. Define or identify given names or terms.
   2. Match a given statement with the appropriate name or term.

B. Explain the basic concepts of physics.
   1. Discuss in writing a given concept.
   2. Select from several choices the proper description of a given topic.

C. Discuss the basic laws of physics.
   1. Describe in writing a given physical law.
   2. Write the mathematical formulation of a given law.
   3. Identify a particular law when expressed by a given mathematical formula.

D. Apply the terms, concepts, and basic laws of physics.
   1. Solve problems similar to those in the textbook.
   2. Solve an unfamiliar problem using the familiar laws and concepts.

E. Interpret an equation and predict how the variation of one or more parameters affects the physical quantity defined by the equation.

F. Approach the learning of the subject in a consistent and disciplined manner.
   1. Attend class sessions regularly and punctually.
   2. Turn in homework assignments regularly and on time.
   3. Participate in regular class recitation.

G. Demonstrate the ability for critical thinking analysis.
   1. Organize presentations of papers or answers to questions.
   2. Derive results from given information.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

A. Required Materials
   1. Textbooks:
      Serway, Raymond A., and John W. Jewett W. Jewett. Physics for Scientists and Engineers with Modern Physics, Hybrid (With Enhanced Webassign Homework and Ebook Loe Printed Access Card for Multi Term Math and Science. City: Brooks/Cole Pub Co, 2013.
      ISBN-13: 9781305086333
   2. Other:
      Webassign access. Class key: **oru 0991 2366**
      None

B. Optional Materials
   1. Textbooks
   2. Other
      None

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
      a. Three tests are given in class. The tests will account for 60% of the final course grade. In lieu of one test, a group project grade may be substituted. The project will count the same amount as one exam.
      b. Homework will be assigned in Webassign by instructor after each class. The due date is at midnight of the following class. The amount of problems varies between 7-14 per assignment. The semester's homework will account for 20% of the final course grade.
      c. The final average of the semester will be reduced by one point for each unexcused absence above the first three.
   2. Whole Person Assessment Requirements

      A research paper on the history and development of some aspect of electricity, magnetism, and/or light and optics (as related to the Christian worldview) must be submitted both electronically to the student's General Education WPA file and also as a hard copy to the instructor.
   3. Other Policies and/or Procedures
      a. The performance expected following each module listed under VII (Calendar Topic Listing and Sequence) is the performance described in section II objectives as applied to the topics covered in that part of the module.
      b. Any extra-credit or extension on the homework is available to the students who have impeccable attendance records.
      c. Any student who scores below 65% on initial assessment test, should need to do 1-2 hours weekly tutoring with professor at his office, during Tuesday or Thursday mornings until substantial improvement is shown on the next exam.

VI. COURSE CALENDAR

Lesson	Topic	Date
AT	**Physics I, initial assessment test**	**08/14**
15-18	**Oscillatory Motion.**	
15.1-15.3	Motion and Energy of The Simple Harmonic Oscillator	**08/17**
15.4-15.7	The Pendulum. Damped and Forced Oscillations	**08/19**
16.1-16.3	Propagation of a disturbance. Travelling wave. Speed on strings	**08/21**
16.4-16.6	Reflection & Transmission. Rate of Energy Transfer. Linear Wave Equation.	**08/24**
17.1-17.2	Pressure Variations and Speed of Sound Waves	**08/26**
17.3-17.4	Intensity of periodic sound waves and Doppler Effect	**08/28**
18.1-18.4	Standing waves. Resonance	**08/31**
18.5-18.7	Standing waves in Air, Rods and Membranes	**09/02**
	Review Exercises	**09/04**
Ex1	**Exam 1, Chapter 15-18**	**09/09**
23-28	**Electricity**	
23.1-23.4	Electric charges. Coulomb's Law. Particle in Electric Field	**09/11**
23.5-23.7	Electric Field of a Continuous Distribution. E Field Lines. Motion of a charged particle in a uniform Electric Field	**09/14**
24.1-24.2	Electric Flux. Gauss's Law	**09/16**
24.3-24.4	Application of Gauss's Law to various charges Distribution. Conductors in Electrostatic Equilibrium.	**09/18**
25.1-25.4	Electric Potential and Electric Field	**09/21**
25.5-25.8	Electric Potential Due to: Continuous Charge Distributions, Charged conductors and applications.	**09/23**
26.1-26.4	Capacitance and Energy stored in a capacitor	**09/25**
26.5-26.7	Capacitors with dielectrics. Electric dipole in an Electric Field.	**09/28**
27.1-27.3	Electric Current. Resistance. Model for Electrical Conduction	**09/30**
27.4-27.6	Resistance and Temperature. Superconductors. Electrical Power	**10/02**
28.1-28.4	Electromotive force. Resistor is series and parallel. Kirchhoff. RC circuits	**10/05**
	Review Exercises	**10/07**
Ex2	**Exam 2, Chapters 23-28**	**10/09**

29-33	**Magnetism**	
29.1-29.3	Motion and App. of a charge in a Uniform Magnetic Field	**10/19**
29.4-29.6	Magnetic force on a current-carrying conductor. Torques on a current loop in a Uniform magnetic Field. The Hall effect	**10/21**
30.1-30.3	Biot-Savart Law. Magnetic Force between two parallels conductors. Ampere's Law	**10/23**
30.4-30.6	Magnetic Field in a solenoid. Gauss's Law in Magnetism. Magnetism in Matter	**10/26**
31.1-31.3	Faraday's Law of Induction. Motional emf. Lenz's Law	**10/28**
31.4-31.6	Induced emf and Electric Fields. Generators and Motors. Eddy's	**10/30**
32.1-32.3	Self-Induction and Inductance. RL circuits. Energy in Magnetic fields.	**11/04**
32.4-32.6	Mutual Inductance. Oscillations in an LC circuit. RLC circuit	**11/06**
33.1-33.5	AC sources. R, L & C in AC circuits. RLC series in AC circuit	**11/09**
33.6-33.9	Resonance in RLC circuit. Transformer & Power Trasnmission. Rectifiers and Filters.	**11/11**
	Review Exercises	**11/13**
Ex3	**Exam 3, Chapters 29-33**	**11/16**
34-38	**Electromagnetic Waves and Light**	
34.1-34.4	Displacement Current and the general form of Amperes's Law. Maxwell equations. Plane E-waves. Energy carried by E-waves.	**11/18**
35.4-35.6	Reflection, Refraction and Huygen's principle.	**11/20**
36.1-36.4	Images formed by mirrors, lenses and thin lenses.	**11/23**
37.1-37.3	Young's Double Slit experiment. Interference condition and Intensity function.	**11/30**
38.1-38.4	Diffraction Patterns for single slit and grating.	**12/02**
	Review Final Exam (Solving in class previous exam's)	**12/04**

Course Inventory for ORU's Student Learning Outcomes
PHY 112—Physics II Lecture
Fall 2015

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.

OUTCOMES & Proficiencies/Capacities	Significant Contribution	Moderate Contribution	Minimal Contribution	No Contribution
1	**Outcome #1 – Spiritually Alive** Proficiencies/Capacities				
1A	Biblical knowledge				X
1B	Sensitivity to the Holy Spirit			X	
1C	Evangelistic capability				X
1D	Ethical behavior				X
2	**Outcome #2 – Intellectually Alert** Proficiencies/Capacities				
2A	Critical thinking	X			
2B	Information literacy		X		
2C	Global & historical perspectives		X		
2D	Aesthetic appreciation			X	
2E	Intellectual creativity		X		
3	**Outcome #3 – Physically Disciplined** Proficiencies/Capacities				
3A	Healthy lifestyle				X
3B	Physically disciplined lifestyle				X
4	**Outcome #4 – Socially Adept** Proficiencies/Capacities				
4A	Communication skills			X	
4B	Interpersonal skills			X	
4C	Appreciation of cultural & linguistic differences				X
4D	Responsible citizenship				X
4E	Leadership capacity				X