

Syllabus for
PHY 211—Introduction to Modern Physics Lecture
3 Credit Hours
Spring 2013

I. COURSE DESCRIPTION

An introductory treatise of theory of relativity, atomic structure, 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 purpose of this course is to enable the student to do the following:

- A. Gain the foundation necessary to deal intelligently with the problems occurring in this nuclear age.
- B. Develop 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. STUDENT LEARNING OUTCOMES FOR THIS COURSE

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

- A. Discuss the historical development of physics in the twentieth century.
- B. Identify and associate the technical names and terms of significant people in modern physics by doing the following:
 - 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 doing the following:
 - 1. Writing a paragraph or a given concept.
 - 2. Selecting the proper description of a given topic from several choices.
- D. Show acquaintance with the basic laws of modern physics as evidenced by doing the following:
 - 1. Describing in writing a given physical law.
 - 2. Writing the mathematical formulation of a given law.
 - 3. Identifying a particular law when expressed by a given mathematical formula.

- E. Apply the terms, concepts, and basic laws of modern physics by doing the following:
 - 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 doing the following:
 - 1. Organizing presentations of papers or answers to questions.
 - 2. Deriving results from given information.

IV. TEXTBOOKS AND OTHER LEARNING RESOURCES

- A. Required Materials
 - 1. Textbooks
Serway, Raymond A., Clement J. Moses, and Curt A. Moyer. *Modern Physics*. 3rd ed. Orlando, FL: Thompson/Brooks/Cole, 2004. ISBN-13: 9780534493394
 - 2. Other
None
- B. Optional Materials
 - 1. Textbooks
None
 - 2. Other
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. 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 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 event 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. Department Policies and Procedures

1. A fee of \$15.00 is assessed for all late exams. This policy applies to all exams taken without notifying the professor prior to the regularly scheduled exam time and to all exams taken late without an administrative excuse.
2. Any student whose unexcused absences total 33% or more of the total number of class sessions receives an F for the course grade.

C. Course Policies and Procedures

1. Evaluation Procedures
 - a. At the end of the semester, the average of the exams accounts for 60% of the final course grade.
 - b. The semester's homework accounts for 20% of the final course grade.
 - c. The final exam accounts for 20% of the course grade.
2. Whole Person Assessment Requirements:

The final grade is reduced by 5% for any WPA artifacts that are not submitted by the end of the semester (5% total not per artifact).
3. Other Policies and/or Procedures
 - a. Two or three one-hour exams are given throughout the semester.
 - b. Homework is assigned in the class and is due at the beginning of class on the due date. Points are taken off for late homework.
 - c. **The instructor may assign a term paper.**
 - d. The performance expected following each part of each module listed under VI **Topic Listing and Sequence** is the performance described in II **Learning Outcomes** as applied to the topics covered in that part of that module.

VI. COURSE CALENDAR

Week	Topic	Reading
1	Classical Physics Dilemma	Background
2	Relativity I	Chapter 1
3	Relativity II	Chapter 2
4	Quantum Theory of Light	Chapter 3
5	Particle Nature of Matter	Chapter 4
6	Matter Waves	Chapter 5
	Test 1: Chapters 1-5	
7	Quantum Mechanics in One Dimension	Chapter 6
8	Tunneling	Chapter 7
9	3 D Quantum Mechanics	Chapter 8
10	Atomic Structure	Chapter 9
11	Statistical Physics	Chapter 10
	Test 2: Chapters 6-10	
12	Molecular Structure	Chapter 11
13	Solid State	Chapter 12
14	Nuclear Structure	Chapter 13
15	Nuclear Applications/Elementary Particles	Chapters 14-15
	Test 3: Chapters 11-15	
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.

Course Inventory for ORU's Student Learning Outcomes
PHY 211—Introduction to Modern Physics Lecture
Spring 2013

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
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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	