

Physics

SCI-1200

2022 07/01/2022 to 06/30/2023 Modified 04/29/2022

Course Description

Physics is intended to expose students to physical and mathematical relationships that describe the world that God has created. The first semester of this course focuses on Newtonian mechanics while the second semester covers a variety of topics including electricity and magnetism, sound and light waves, and modern physics. The course incorporates virtual simulations as a component to expand the students' understanding as well as provide real-world applications.

Rationale

Students taking this course will gain an understanding of the mathematical and conceptual means by which scientists represent and comprehend the material world in which we live. By studying the relationships between various materials and their functions, students will begin to understand the world around them in a critical and analytical way. This course will cause students to develop skills of experimentation and discovery, careful observation, and critical thought.

Prerequisite

Completion of Algebra I, II, and Geometry

Measurable Learning Outcomes

- A. The student will conduct investigations using experimental processes.
- B. The student will investigate and understand how to analyze and interpret data.
- C. The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning, and logic.
- D. The student will investigate and understand how applications of physics affect the world.
- E. The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes.
- F. The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved.
- G. The student will investigate and understand that energy can be transferred and transformed to provide usable work.
- H. The student will investigate and understand wave phenomena.
- I. The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation.
- J. The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces.
- K. The student will investigate and understand how to diagram, construct, and analyze basic electrical circuits and explain the function of various circuit components.

L. The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics.

Course Resources

See LUOA's [Systems Requirements](#) for computer specifications necessary to operate LUOA curriculum. Also view [Digital Literacy Requirements](#) for LUOA's expectation of users' digital literacy.

This course makes use of third-party digital resources to enhance the learning experience. LUOA staff and faculty have curated these resources. Students can safely access them to complete coursework. Please ensure that internet browser settings, pop-up blockers, and other filtering tools allow for these resources to be accessed. See Technologies and Resources Used in this Course below for a specific list.

- Note: Embedded YouTube videos may be utilized to supplement LUOA curriculum. YouTube videos are the property of the respective content creator, licensed to YouTube for distribution and user access. As a non-profit educational institution, LUOA is able to use YouTube video content under the YouTube Terms of Service. For additional information on copyright, please contact the [Jerry Falwell Library](#).

Scripture Attribution

- Grades 7-12: All Scripture quotations, unless otherwise indicated, are from the ESV[®] Bible (The Holy Bible, English Standard Version[®]), copyright © 2001 by Crossway, a publishing ministry of Good News Publishers. Used by permission. All rights reserved. May not copy or download more than 500 consecutive verses of the ESV Bible or more than one half of any book of the ESV Bible.

Policies

Students are accountable for all information in the [Student Handbook \(https://www.liberty.edu/online-academy/wp-content/uploads/2021/11/LUOA-Student-Handbook.pdf\)](https://www.liberty.edu/online-academy/wp-content/uploads/2021/11/LUOA-Student-Handbook.pdf). Below are a few policies that have been highlighted from the Student Handbook.

Course Grading Policies

The student's grades will be determined according to the following grading scale and assignment weights. The final letter grade for the course is determined by a 10-point scale. Assignments are weighted according to a tier system, which can be referenced on the Grades page in Canvas. Each tier is weighted according to the table below. Items that do not affect the student's grade are found in Tier 0.

Grading Scale	Assignment Weights
A 90-100%	Tier 0 0%
B 80-89%	Tier 1 25%
C 70-79%	Tier 2 35%
D 60-69%	Tier 3 40%
F 0-59%	

In order for students to receive credit for a course, the following conditions have to be met:

- All semester exams and module tests have to be completed.
- All Tier 3 projects or papers have to be completed.
- Fewer than 10 zeros exist in the gradebook for blank submissions in a full credit course and 5 zeros for blank submissions in a semester course.

Types of Assessments

To simplify and clearly identify which policies apply to which assessment, each assessment has been categorized into one of four categories: Lesson, Assignment, Quiz, or Test. Each applicable item on the course Modules page has been designated with an identifier chosen from among these categories. Thus, a Quiz on the American Revolution may be designated by the title, "1.2.W - Quiz: The American Revolution." These identifiers were placed on the Modules page to help students understand which Resubmission and Honor Code policies apply to that assessment (see the Resubmission Policy and Honor Code Policy below for further details).

- **Lesson:** *Any item on the Modules page designated as a "Lesson"*

These include instructional content and sometimes an assessment of that content. Typically, a Lesson will be the day-to-day work that a student completes.

- **Assignment:** *Any item on the Modules page designated as an "Assignment"*

Typical examples of Assignments include, but are not limited to, papers, book reports, projects, labs, and speeches. Assignments are usually something that the student should do his or her best work on the first time.

- **Quiz:** *Any item on the Modules page designated as a "Quiz"*

This usually takes the form of a traditional assessment where the student will answer questions to demonstrate knowledge of the subject. Quizzes cover a smaller amount of material than Tests.

- **Test:** *Any item on the Modules page designated as a "Test"*

This usually takes the form of a traditional assessment where the student will answer questions to demonstrate knowledge of the subject. Tests cover a larger amount of material than Quizzes.

Resubmission Policy

Students are expected to submit their best work on the first submission for every Lesson, Assignment, Quiz, and Test. However, resubmissions may be permitted in the following circumstances:

- **Lesson:** Students are automatically permitted two attempts on a Lesson. Students may freely resubmit for their first two attempts without the need for teacher approval.
- **Assignment:** Students should do their best work the first time on all Assignments. However, any resubmissions must be completed before the student moves more than one module ahead of that Assignment. For example, a student may resubmit an Assignment from Module 3 while in Module 4, but not an Assignment from Modules 1 or 2. High School students may not resubmit an Assignment without expressed written permission from the teacher in a comment.
- **Quiz:** Students may NOT resubmit for an increased grade.
- **Test:** Students may NOT resubmit for an increased grade.

If a student feels that he or she deserves a resubmission on a Lesson, Assignment, Quiz, or Test due to a technical issue such as a computer malfunction, the student should message his or her teacher to make the request.

Honor Code Policy

Every time a student violates the Honor Code, the teacher will submit an Honor Code Incident Report. The Student Support Coordinator will review the incident and allocate the appropriate consequences. Consequences, which are determined by the number of student offenses, are outlined below:

- **Warning:** This ONLY applies to high school Lessons and elementary/middle school Assignments and Lessons. Students should view these actions as learning opportunities.
 - **Lessons:** A zero will be assigned for the question only.
 - **Elementary/Middle School Assignment:** The student must redo his or her work; however, the student may retain his or her original grade.
- **1st Offense:**
 - **Lesson, Quiz, or Test:** The student will receive a 0% on the entire assessment.
 - **Assignment:** The student will either:

- Receive a 0% on the original assignment
- Complete the Plagiarism Workshop
- Retry the assignment for a maximum grade of 80%
- **2nd Offense:** The student will receive a 0% and be placed on academic probation.
- **3rd Offense:** The student will receive a 0% and the Director of Faculty will determine the consequences that should follow, possibly including withdrawal from the course or expulsion from the academy.

Materials Selection Policy

LUOA curates educational materials that are consistent with the school's philosophy; however, the fallen human condition depicted in literature (as in Scripture itself) is not always pleasant. Valuable works sometimes have objectionable or profane elements. Good books provide four (4) recognized values.

- They build godly attitudes and character traits.
- They deepen our social and cultural awareness.
- They strengthen our use of written language.
- They provide a lifelong source of enjoyment and relaxation.

In order to instill these values in students and fulfill the stated objectives of the school, all LUOA students are expected to read and study good books on a regular basis. Recognizing that materials designed for one level may not be appropriate for another, three (3) levels of criteria are applied:

- Elementary materials must contain no objectionable material,
- Objectionable elements in sixth through eighth-grade materials must be limited and must serve a specific educational purpose, and
- Objectionable content may be included in high school materials but must be outweighed by positive literary, curricular, and/or Christian values.

The curriculum department has approved required educational materials for students.

Schedule

Module 1: Motion in One Dimension

Week 1: Scientific Figures and Units

Week 2: What Makes it Move

Week 3: One-Dimensional Equations

Week 4: Free Fall and Module Quiz

Module 2: Motion in Two Dimensions

Week 5: Two-Dimensional Vectors

Week 6: Using Two-Dimensional Vectors

Module 3: Newton's Laws

Week 7: What are the Laws?

Week 8: Applications of the Laws

Week 9: More Applications of the Laws & 1st Quarter Test

Module 4: Circular Motion, Gravity, & Work

Week 10: Circular Motion

Week 11: Gravity & Work

Week 12: Work & Energy

Module 5: Work, Energy, & Momentum

Week 13: Hooke's Law

Week 14: Conservation & Kinetic Energy

Week 15: Power

Week 16: Momentum

Week 17: Conservation Momentum

Week 18: Angular Momentum & 2nd Quarter Test

Module 6: Periodic Motion & Waves

Week 19: Let the Pendulum Swing

Week 20: Types of Waves

Week 21: Doppler, Resonance, and Harmonics & Module Quiz

Module 7: Geometric Optics

Week 22: How Does Light Move?

Week 23: Circuits

Module 8: Coulomb's Lab & Electricity

Week 24: Electrostatics

Week 25: Electric Fields

Week 26: Potential & Capacitance

Week 27: Capacitance & 3rd Quarter Test

Module 9: Electric Potential & Circuits

Week 28: Introduction to Electric Charges

Week 29: Series Circuit

Week 30: Parallel Circuit

Week 31: Magnetism

Module 10: Waves, Nuclear, Radiation, & Relativity

Week 32: Light Waves

Week 33: Nuclear Physics

Week 34: Half Life

Week 35: Relativity

Week 36: Module Quiz & 4th Quarter Test