Course Description
Physics is intended to expose students to physical and mathematical relationships that describe this 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 and Geometry as well as completion or current enrollment in Algebra II

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 Materials

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.

Technologies and Resources Used in this Course

The following resource(s) are used throughout this course:

- PhET & Physics Aviary Simulations

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

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90-100%</td>
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<tr>
<td>B</td>
<td>80-89%</td>
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<tr>
<td>C</td>
<td>70-79%</td>
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<tr>
<td>D</td>
<td>60-69%</td>
</tr>
<tr>
<td>F</td>
<td>0-59%</td>
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Assignment Weights

<table>
<thead>
<tr>
<th>Tier</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Tier 0</td>
<td>0%</td>
</tr>
<tr>
<td>Tier 1</td>
<td>25%</td>
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<tr>
<td>Tier 2</td>
<td>35%</td>
</tr>
<tr>
<td>Tier 3</td>
<td>40%</td>
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Course Policies

Students are accountable for all information in the Student Handbook. Below are a few policies that have been highlighted from the Student Handbook.

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 Honor Code and Resubmission policies apply to that assessment (see the Honor Code and Resubmission policies on the pages that follow 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. The student may freely resubmit for their first two attempts without the need for teacher approval.
Assignment: Students are intended to 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, and that request will need to be approved by a Department Chair.

Consequences for Violations to the Honor Code

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 Faculty Chair will determine the consequences that should follow, possibly including withdrawal from the course or expulsion from the academy.
Module 1: Kinematics
Week 1: Introduction
Week 2: Terminology and Error Analysis
Week 3: Vectors and Velocity
Week 4: Acceleration

Module 2: Dynamics
Week 5: Forces and Gravity
Week 6: Force and Friction
Week 7: Buoyancy
Week 8: Research Paper

Module 3: Applications of Newton’s Laws
Week 9: Basic Force Analysis
Week 10: Centripetal Force
Week 11: Momentum
Week 12: Torque

Module 4: Work & Energy
Week 13: Hooke’s Law
Week 14: Conservation of Energy
Week 15: Simple Machines
Week 16: Nuclear Energy

Module 5: Two-Dimensional Motion; Semester Exam
Week 17: Two-Dimensional Motion
Week 18: Semester Exam

Module 6: Electric & Magnetic Fields
Week 19: Electrostatics
Week 20: Electric Field
Week 21: Capacitance
Week 22: Magnetism

Module 7: Electric Circuits & Electromagnetism
Week 23: Resistance
Week 24: Circuits
Week 25: Power and Energy
Week 26: Electromagnetism

Module 8: Waves & Simple Harmonic Motion
Week 27: Wave Interactions
Week 28: Properties of Waves
Week 29: Sound Waves & Standing Waves
Week 30: Simple Harmonic Motion

Module 9: Light Waves & Nuclear Physics
Week 31: Light Waves
Week 32: Lenses
Week 33: Nuclear Physics
Week 34: Research Paper

Module 10: Modern Physics
Week 35: Relativity
Week 36: Semester Exam