

SCI1200_202338_Staging_EMBR_TEM

SCI-1200

2023 05/01/2023 to 04/30/2024 Modified 03/22/2023

Course Description

This year-long foundational course allows students to explore the physical and mathematical relationships that describe the world God created. The first semester of this course focuses on Newtonian mechanics and the laws of the physical world related to work, motion, gravity, types of energy, and power. The second semester covers pendulums, sound and light waves, electricity and magnetism, particle and solid-state physics, and other applications of physics in the modern world. Virtual demonstrations and lab exercises require students to apply the theories they learn practically. This course requires strong mathematical skills. Students discover the perfection and order of God's creation as they investigate the laws and patterns that govern physics in the natural world.

Rationale

This course provides 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 critically and analytically. This course will cause students to develop skills of experimentation and discovery, careful observation, and critical thought.

Course 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 Ember's [Systems Requirements](#) for computer specifications necessary to operate this curriculum.

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

* Course Policies

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."

- **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.

Materials Selection Policy

Ember 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 Ember 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.

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.

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. With Ember, the teacher may be a physical school teacher or the student's parent/guardian. The teacher can give another attempt from his or her Canvas account. For more information on how to do this, please review the Ember orientation course.

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 Motion

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 of 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: Lenses and Optics

Module 8: Coulomb's Lab & Electricity

- Week 24: Electrostatics
- Week 25: Electric Fields
- Week 26: Potential & Capacitance
- Week 27: Capacitance & Quarter 3 Exam

Module 9: Electric Potential & Circuits

- Week 28: Introduction to Electric Circuits
- Week 29: Series Circuits
- Week 30: Parallel and Combination Circuits
- Week 31: Magnetism

Module 10: Particle & Solid-State Physics, Nuclear Reactions & Relativity

- Week 32: Particle & Solid-State Physics
- Week 33: Nuclear Physics
- Week 34: Half-Life
- Week 35: Relativity
- Week 36: Module Quiz & 4th Quarter Exam