

*Physics of the Universe* integrates physics with Earth and space science. Throughout the course, students apply fundamental physics concepts to better understand the impact of human activities on Earth's systems and how forces, energy, and matter interact throughout the universe.

Course topics include electricity and magnetism, energy consumption and resources, dynamics, momentum and gravitation, waves, cosmology, and an exploration of Earth's physical systems.

Students discover new concepts through guided instruction and confirm their understanding in an interactive, feedback-rich environment. Scientific inquiry skills are embedded in the direct instruction, wherein students learn to ask scientific questions, form and test hypotheses, and use logic and evidence to draw conclusions about the concepts.

A variety of activities encourage students to think scientifically. Lab and Project activities reinforce critical thinking, writing, and communication skills and help students develop a deeper understanding of the nature of science and engineering. Virtual Lab activities enable students to engage in investigations that require long periods of observation at remote locations and to explore simulations that allow scientists to test predictions. In Discussions, students compare their lab or project results and exchange ideas about their investigations. Checkup and Practice activities provide additional opportunities for students to apply learned concepts and practice their writing and scientific reasoning skills.

This course is built to Next Generation Science Standards. Throughout the course, students are evaluated via a variety of assessments designed to prepare them for the content, form, and depth of state exams.

## UNIT 1: INTRODUCTION TO PHYSICS OF THE UNIVERSE

- Lesson 1: Math in Physics
- Lesson 2: Math for Motion
- Lesson 3: Introduction to Physics of the Universe Wrap-Up

## UNIT 2: ENERGY IN THE UNIVERSE

- Lesson 1: Energy and Forces
- Lesson 2: Conservation of Energy
- Lesson 3: Doing Science: Energy in the Universe
- Lesson 4: Energy in the Universe Wrap-Up

## UNIT 3: ELECTRICITY AND MAGNETISM

- Lesson 1: Electricity
- Lesson 2: Electrical Circuits
- Lesson 3: Magnetism and Electromagnetism
- Lesson 4: Doing Science: Electricity and Magnetism
- Lesson 5: Electricity and Magnetism Wrap-Up

## UNIT 4: ENERGY CONSUMPTION AND RESOURCES

- Lesson 1: Introduction to Energy Resources
- Lesson 2: Energy Consumption and Climate Change
- Lesson 3: Energy Resources and Sustainability
- Lesson 4: Doing Engineering: Energy Consumption and Resources
- Lesson 5: Energy in the Universe Wrap-Up

## UNIT 5: DYNAMICS

- Lesson 1: Force and Motion

- Lesson 2: Calculations with Forces
- Lesson 3: Doing Science: Dynamics
- Lesson 4: Dynamics Wrap-Up

## **UNIT 6: SEMESTER WRAP-UP**

- Lesson 1: Semester Review and Exam

## **UNIT 7: MOMENTUM AND GRAVITATION**

- Lesson 1: Momentum
- Lesson 2: Planetary Physics
- Lesson 3: Doing Science: Collisions
- Lesson 4: Momentum and Gravitation Wrap-Up

## **UNIT 8: WAVES**

- Lesson 1: Introduction to Wave Motion
- Lesson 2: Sound and Light
- Lesson 3: Light Technology
- Lesson 4: Doing Science: Evaluating Scientific Claims
- Lesson 5: Waves Wrap-Up

## **UNIT 9: COSMOLOGY**

- Lesson 1: Origins of the Universe
- Lesson 2: Stars
- Lesson 3: Our Solar System
- Lesson 4: Doing Science: Modeling Nuclear Reactions
- Lesson 5: Cosmology Wrap-Up

## **UNIT 10: GEOPHYSICS**

- Lesson 1: The Geosphere
- Lesson 2: Earth's Plates
- Lesson 3: Our Changing Planet
- Lesson 4: Modeling Geologic Processes
- Lesson 5: Geophysics Wrap-Up

## **UNIT 11: SEMESTER WRAP-UP**

- Lesson 1: Semester Review and Exam